

POPULATION¹

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THE population of the principal states, of which an account has been given in the course of this work, will be found under their proper heads. The object of this article is to explain the general laws which regulate the increase or decrease of population, and the manner in which they affect the state and condition of human society.

In taking a view of animated nature, we cannot fail to be struck with a prodigious power of increase in plants and animals. Their capacity in this respect is indeed almost infinitely various, according with the endless variety of the works of nature, and the different purposes which they seem appointed to fulfil. But whether they increase slowly or rapidly, if they increase by seed or generation, their natural tendency must be to increase in a geometrical ratio, that is, by multiplication; and at whatever rate they are increasing during any one period, if no further obstacles be opposed to them, they must proceed in a geometrical progression.

In the growth of wheat a vast quantity of seed is unavoidably lost. When it is dibbled instead of being sown in the common way, two pecks of seed wheat will yield as large a crop as two bushels, and thus quadruple the proportion of the return to the quantity of seed put into the ground. In the *Philosophical Transactions* for 1768 an account is given of an experiment in which, by separating the roots obtained from a single grain of wheat, and transplanting them in a favourable soil, a return was obtained of above 500,000 grains. But without referring to peculiar instances or peculiar modes of cultivation, it is known that calculations have often been made, founded on positive experience, of the produce of wheat in different soils and countries, cultivated in an ordinary way, and making allowance for all ordinary destruction of seed.

Humboldt has collected some estimates of this kind, from which it appears that France, the north of Germany, Poland, and Sweden, taken generally, produce from live to six grains for one; some fertile lands in France produce fifteen for one; and the good lands in Picardy and the Isle of France from eight to ten grains for one. Hungary, Croatia, and Slavonia yield from eight to ten grains for one. In the Regno de la Plata, twelve grains for one are produced; near the city of Buenos Ayres, sixteen for one; in the northern part of Mexico, seventeen; and in the equinoctial regions of Mexico, twenty-four for one.²

Now, supposing that in any one country during a certain period, and under the ordinary cultivation, the return of wheat was six grains for one, it would be strictly correct to say that wheat had the capacity of increasing in a geometrical ratio, of such a nature as to sextuple itself every year. And it might safely be calculated hypothetically, that if setting out from the produce of one acre, land of the same quality could be prepared with sufficient rapidity, and no wheat were consumed, the rate of increase would be such as completely to cover the whole earthy surface of our globe in fourteen years.

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In the same manner, if it be found by experience that on land of a certain quality, and making allowance for the ordinary mortality and accidents, sheep will increase on an average so as to double their numbers every two years, it would be strictly correct to say that sheep have the natural capacity of increasing in a geometrical progression, of which the common multiple is two, and the term two years; and it might safely be said, that if land of the same quality could be provided with sufficient rapidity, and no sheep were consumed, the rate of increase would be such, that if we were to begin with the full number which could be supported on an acre of land, the whole earthy part of the globe might be completely covered with sheep in less than seventy-six years.

If out of this prodigious increase of food, the full support of mankind were deducted, supposing them to increase as fast as they have ever yet increased in any country, the deduction would be comparatively inconsiderable; and the rate of increase would still be enormous, till it was checked, either by the natural want of will on the part of mankind to make efforts for the increase of food beyond what they could possibly consume, or, after a certain period, by their absolute want of power to prepare land of the same quality, so as to allow of the same rate of progress.

Owing to these two causes combined, we see that, notwithstanding this prodigious power of increase in vegetables and animals, their actual increase is extremely slow; and it is obvious, that, owing to the latter cause alone, and long before a final stop was put to all further progress, their actual rate of increase must of necessity be very greatly retarded; as it would be impossible for the most enlightened human efforts to make all the soil of the earth equal in fertility to the average quality of land now in use; while the practicable approaches towards it would require so much time as to occasion, at a very early period, a constant and great check upon what their increase would be if they could exert their natural powers.

Elevated as man is above all other animals by his intellectual faculties, it is not to be supposed that the physical laws to which he is subjected should be essentially different from those which are observed to prevail in other parts of animated nature. He may increase slower than most other animals, but food is equally necessary to his support; and if his natural capacity of increase be greater than can be permanently supplied with food from a limited territory, his increase must be constantly retarded by the difficulty of procuring the means of subsistence.

The main peculiarity which distinguishes man from other animals, in the means of his support, is the power which he possesses of very greatly increasing these means. But this power is obviously limited by the scarcity of land, by the great natural barrenness of a very large part of the surface of the earth, and by the decreasing proportion of produce which must necessarily be obtained from the

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continual additions of labour and capital applied to land already in cultivation.

It is, however, specifically with this diminishing and limited power of increasing the produce of the soil, that we must compare the natural power of mankind to increase, in order to ascertain whether, in the progress to the full cultivation and peopling of the globe, the natural power of mankind to increase must not of absolute necessity be constantly retarded by the difficulty of procuring the means of subsistence, and if so, what are likely to be the effects of such a state of things.

In an endeavour to determine the natural power of mankind to increase, as well as their power of increasing the produce of the soil, we can have no other guide than past experience.

The great check to the increase of plants and animals, we know from experience, is the want of room and nourishment; and this experience would direct us to look for the greatest actual increase of them in those situations where room and nourishment were the most abundant.

On the same principle, we should expect to find the greatest actual increase of population in those situations where, from the abundance of good land, and the manner in which its produce is distributed, the largest portion of the necessities of life is actually awarded to the mass of the society.

Of the countries with which we are acquainted, the United States of America, formerly the North American colonies of Great Britain, answer most nearly to this description. In the United States not only is there an abundance of good land, but, from the manner in which it has been distributed, and the market which has been opened for its produce, there has been a greater and more constant demand for labour, and a larger portion of necessities has been awarded to the labourer, than in any of those other countries which possess an equal or greater abundance of land and fertility of soil.

Here, then, we should expect to find that the natural power of mankind to increase, whatever it may be, would be most distinctly marked; and here, in consequence, it appears that the actual rate of the increase of population has been more rapid than in any known country, although, independently of the abundance of good land, and the great demand for labour, it is distinguished by no other circumstances which appear to be peculiarly favourable to the increase of numbers.

It has been stated that all animals, according to the known laws by which they are produced, must have a capacity of increasing in a geometrical progression. And the question with regard to man is, what is the rate of this geometrical progression?

Fortunately, in the country to which we should naturally turn our eyes for an exemplification of the most rapid rate of increase, there have been four enumerations of the people, each at the distance of

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ten years; and though the estimates of the increase of population in the North American colonies at earlier periods were of sufficient authority, in the absence of more certain documents, to warrant most important inferences, yet as we now possess such documents, and as the period they involve is of sufficient length to establish the point in question, it is no longer necessary to refer to earlier times.

According to a regular census made by order of Congress in 1790, which there is every reason to think is essentially correct, the white population of the United States was found to be 3,164,148. By a similar census in 1800, it was found to have increased to 4,312,841. It had increased, then, during the ten years from 1790 to 1800, at a rate equal to 36.3 per cent., a rate which, if continued, would double the population in twenty-two years and about four months and a half.

According to a third census, in 1810, the white population was found to be 5,862,092,³ which, compared with the population of 1800, gives an increase in the second ten years at the rate of nearly thirty-six per cent., which, if continued, would double the population in about twenty-two years and a half.

According to the fourth census, in 1820, the white population was found to be 7,861,710,⁴ which, compared with the population of 1810, gives an increase in the third ten years at a rate per cent. of 34.1, which, if continued, would double the population in twenty-three years and seven months.

If we compare the period of doubling according to the rate of increase in the most unfavourable ten years of this series, with twenty-five years, we shall find the difference such as fully to cover all the increase of population which would have taken place from emigration.

It appears from a reference to the most authentic documents which can be collected on both sides of the Atlantic, that the emigration to the United States, during the last twenty-five years, falls decidedly short of an average of 10,000 a year. Dr Seybert, the best authority on the other side of the water, states that, from 1790 to 1810, it could not have been so much as 6000 a year. Our official accounts of the number of emigrants to the United States from England, Ireland, and Scotland, during the ten years from 1812 to 1821 inclusive, give an average of less than 7000, although the period includes the extraordinary years 1817 and 1818, in which the emigrations to the United States were much greater than they were ever known to be before or since. The official American accounts, as far as they go, which is only for two years from the 30th September 1819, tend to confirm this average;⁵ and, allowing fully for the emigrants from other European countries, the general average will still be under the ten thousand.

A new mode was, however, some time ago suggested of estimating the amount of increase in any country derived from emigration.⁶

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It has been justly stated, that when a census is taken every ten years, and the population is distinguished into those above and those below ten years of age, all above ten years of age, exclusive of emigrants, must have existed in the census immediately preceding, and, consequently, after having made a proper allowance for the mortality during these ten years, the excess above the remaining number must be attributed to emigration. If we had the means of estimating with accuracy the loss which would be sustained in America in ten years by a population not increased by additional births, this mode of estimating the amount of emigration would be unobjectionable, and often very useful.

But unfortunately the means are deficient. Even the annual mortality in the United States is not known. It was supposed by Dr Price (vol. ii. p. 50, 7th edit.) to be one in fifty; by Mr Barton, in the Transactions of the Society at Philadelphia (vol. iii. No. 7), one in forty-five; and it is stated by Mr Bristed, in his work on America and her Resources (p. 20), that the annual deaths average throughout the United States one in forty, in the healthiest districts one in fifty-six, and in the most unhealthy one in thirty-five.

If, however, we could ascertain accurately the average annual mortality, we should still be unable to ascertain the amount of the loss in question; as, under any given law of mortality, it would depend so very much upon the rate at which the population was increasing. The truth of this observation will be placed in a striking light by the following short table, with which we have been favoured by a very able calculator, Mr Milne, author of a well-known Treatise on Annuities and Assurances. It is constructed on the supposition that the population, in each case, is always subject to the same law of mortality as that which prevailed in all Sweden and Finland during the five years -ended with 1805, and that the number of births in the present year living in each case is 10,000.

	The Population constantly the same.	The Population increasing in geometrical progression for more than a hundred years, so as to double itself every	
		Fifty Years.	Twenty-five Years.
Total population ten years since.....	393,848	230,005	144,358
Total above ten years of age now.....	320,495	195,566	126,176
Died during the term of ten years, out of those living at its commencement.....	73,353	34,439	18,182
Being one of	5.3692	6.6786	7.9396

We see from this table, that under the same law of mortality, the

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difference of loss sustained in ten years, by a people not increased by fresh births, would in the three cases supposed, of a stationary population, a population doubling in fifty years, and a population doubling in twenty-five years, be as one in 5.3692, one in 6.6786, and one in 7.9396; and that when the population is doubling itself in twenty-five years, the loss would be very little more than one eighth.

But the censuses must be allowed to form a *prima facie* evidence that the population of the United States has, for a considerable time, been going on doubling itself in twenty-five years; and assuming this evidence to be true, which we are warranted in doing till better evidence is produced on the other side, it will appear that the amount of immigration, deduced from the rule here referred to, is less than 10,000 a year.

Thus the white population of the United States in 1800 was 4,312,841.⁷ This population, without further accession of births, would in 1810 be diminished one eighth, or reduced to 3,773,736. In 1810 the population above ten years of age was 3,845,389; and, subtracting the former number from the latter, the difference, or amount of emigration, will be 71,653, or 7165 a year.

Again, the white population of 1810 was 5,862,092, which, diminished by one eighth in ten years, would be 5,129,331. The population above ten years of age in 1820 was 5,235,940.⁸ Subtracting the former from the latter, the difference, or amount of emigration, is 106,608, or 10,660 a year; showing, as we should expect, a greater amount of emigration from 1810 to 1820 than from 1800 to 1810, but, even in the latter ten years, and including emigrations from Canada, as well as all other countries, little exceeding 10,000.

Altogether, then, we can hardly err in defect, if we allow 10,000 a year for the average increase from emigration during the twenty-five years from 1795 to 1820; and applying this number to the slowest period of increase, when the rate was such as to double the population in twenty-three years and seven months, it may be easily calculated, that in the additional year and five months a population of 5,862,000 would have increased to an amount much more than sufficient to cover an annual emigration of 10,000 persons, with the increase from them at the same rate.

Such an increase from them, however, would not take place. It appears from an account in the National Calendar of the United States for the year 1821, that of the 7001 persons who had arrived in America from the 30th of September 1819 to the 30th of September 1820, 1959 only were females, and the rest, 5042, were males; a proportion which, if it approaches towards representing the average, must very greatly reduce the number from which any increase ought to be calculated.

If, however, we omit these considerations; if we suppose a yearly emigration from Europe to America of 10,000 persons for the twenty-five years from 1795 to 1820, the greatest part of which time Eu-

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rope was involved in a most extensive scene of warfare, requiring all its population; and further, if we allow for an increase of all the emigrants during the *whole period*, at the fullest rate; the remaining numbers will still be sufficient to show a doubling of the population in less than twenty-five years.

The white population of 1790 was 3,164,148. This population, according to the rate at which it was increasing, would have amounted to about 3,694,100 in 1795; and supposing it to have just doubled itself in the twenty-five years from 1795 to 1820, the population in 1820 would have been 7,388,200. But the actual white population of 1820 appears, by the census then taken, to be 7,861,710, showing an excess of 473,510; whereas an emigration of 10,000 persons annually, with the increase from them at three per cent., a rate which would double a population in less than twenty-four years, would only amount to 364,592.

But the most striking confirmation of the censuses of the United States, and the most remarkable proof of the rate of increase being occasioned almost exclusively by procreation, have been furnished to us by Mr Milne. In his work on Annuities and Assurances, which contains much valuable and interesting information on the subject of population, he had noticed the effects of the frequent pressure of want on the labouring classes of Sweden, which, by increasing the proportion of deaths, rendered the law of mortality so accurately observed in that country by Professors Wargentin and Nicander inapplicable to other countries more favourably circumstanced. But the law of mortality was observed to be gradually improving from the time that Dr Price constructed his Swedish table; and the period from 1800 to the end of 1805 was so free from scarcities and epidemics, and the healthiness of the country had been further so much improved by the introduction of vaccination, that he justly thought the law of mortality, as observed during these five years, might suit countries where the condition of the people was known to be much better than it had generally been in Sweden. On these grounds he applied the Swedish law of mortality, during the term mentioned, to the hypothesis of a population which had been increasing by procreation, in geometrical progression, for more than a hundred years, so as to double every twenty-five years. Assuming this population to be one million, he distributed it, by a process well known to persons conversant with these subjects, into the different ages referred to in the American censuses, and then compared them with the same number of persons distributed according to the actual returns of the ages in the American censuses for the three periods of 1800, 1810, and 1820. The results are as follows:

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Distribution of a Population of 1,000,000 Persons in the under-mentioned intervals of Age.

Between the Ages of	According to			
	The Hypothesis.	United States.		
		Census of 1800.	Census of 1810.	Census of 1820.
0 and 10	337,592	334,556	344,024	333,995
10 and 16	145,583	154,898	156,345	154,913
16 and 26	186,222	185,046	189,227	198,114
26 and 45	213,013	205,289	190,461	191,139
45 and 100	117,590	120,211	119,943	121,839
0 and 100	1,000,000	1,000,000	1,000,000	1,000,000
Under 16	483,175	489,454	500,369	488,908
Above 16	516,825	510,546	499,631	511,092

The general resemblance in the distribution of the ages in the three different censuses to each other, and to the hypothesis, clearly proves,

1st, That the distribution of the ages in the different enumerations must be made with some care, and may, therefore, be relied on as in the main correct.

2^{dly}, That the law of mortality assumed in the hypothesis cannot deviate essentially from the law of mortality which prevails in the United States; and,

3^{dly}, That the actual structure of the American population differs very little from what it would be if it were increasing regularly from procreation only, in geometrical progression, so as to double itself every twenty-five years; and that we may, therefore, safely infer that it has been very little disturbed by immigration.

If to these proofs of the rapid increase of population which has actually taken place, we add the consideration that this rate of increase is an average applying to a most extensive territory, some parts of which are known to be unhealthy; that some of the towns of the United States are now large; that many of the inhabitants must be engaged in unwholesome occupations, and exposed to many of those checks to increase which prevail in other countries; and further, that in the western territories, where these checks do not occur, the rate of increase is beyond comparison more rapid than the general average, after making the fullest allowance for immigration; it must appear certain, that the rate at which the population of the whole of the United States has actually increased for the last thirty years must fall very decidedly short of the actual capacity of mankind to increase under the most favourable circumstances.

The best proof that can be obtained of the capacity of mankind to increase at a certain rate, is their having really increased at that rate. At the same time, if any peculiarly rapid increase which had appeared to take place in a particular country were quite unsupport-

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ed by other evidence, we might be disposed to attribute it to error or accident, and might scarcely be justified in founding important conclusions upon it. But this is far from being the case in the present instance. The rate of increase which has at times taken place in other countries, under the operation of great and obvious checks to the progress of population, sufficiently shows what might be expected if these checks were removed.

The countries most resembling the United States of America are those territories of the new world which lately belonged to Spain. In abundance and fertility of soil they are indeed superior; but almost all the vices in the government of the mother country were introduced into her colonial possessions, and particularly that very unequal distribution of landed property which takes place under the feudal system. These evils, and the circumstance of a very large part of the population being Indians in a depressed state, and inferior in industry and energy to Europeans, necessarily prevent that rapid increase of numbers which the abundance and fertility of the land would admit of. But it appears, from the instructive and interesting account of New Spain which M. Humboldt has not long since given to the public, that for the last half of the eighteenth century the excess of the births above the deaths, and the progress of the population, have been very great. The following are the proportions of burials to baptisms in the registers of eleven villages, the details of which were communicated to M. Humboldt by the curates.

	Burials.	Baptisms.
At Dolores.....	100	253
Singuilucan.....	100	234
Calymaya.....	100	202
Guanaxuato.....	100	201
St Anne.....	100	195
Marsil.....	100	194
Queretaro.....	100	188
Axapuzco.....	100	157
Yguala.....	100	140
Malacatepec.....	100	130
Panuco.....	100	123
The mean proportion is 100 to 183		

But the proportion which M. Humboldt considers as best suited to the whole of the population is 100 to 170.

In some of the villages above mentioned, the proportion of the births to the population is extraordinarily great, and the proportion of deaths very considerable; showing, in a striking point of view, the early marriages and early deaths of a tropical climate, and the more rapid passing away of each generation.⁹

At Queretaro, it appears that the baptisms were to the population as one to fourteen, and the burials as one to twenty-six.

At Guanaxuato, including the neighbouring mines of St Anne and of Marsil, the baptisms were to the population as one to fifteen, and the burials as one to twenty-nine.

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The general result from all the information which could be collected was, that the proportion of births to the population, for the whole of the kingdom of New Spain, was as one to seventeen, and of the deaths as one to thirty. These proportions of births to deaths, if they were continued, would double the population in twenty-seven and a half years.

M. Humboldt further observes, that the information which he had collected respecting the proportions of the births to the deaths, and of these to the whole population, proves, that if the order of nature were not interrupted by some extraordinary and disturbing causes, the population of New Spain ought to double itself every nineteen years.¹⁰

It is known, however, that these causes do occur in the actual state of things; consequently we cannot consider the actual rate of the increase of population in New Spain as greater than according to the former calculation. But a rate of increase such as to double the population in twenty-seven and a half years, in spite of all the obstacles enumerated by M. Humboldt, is very extraordinary. It is next to the increase of the United States, and greatly superior to any that can be found in Europe.

Yet in Europe, the tendency to increase is always very strongly marked, and the actual increase for periods of some length is sometimes much greater than could be expected beforehand, considering the obstacles to be overcome.

It appears from Süssmilch,¹¹ that the population of Prussia and Lithuania, after the great plague in 1709 and 1710, doubled itself in about forty-four years, from the excess of the births above the deaths enumerated in the registers.

In Russia, the whole population in 1763 was estimated, by enumeration and calculation, at twenty millions, and in 1796 at thirty-six millions.¹² This is a rate of increase which would occasion a doubling in less than forty-two years.

In 1695, the population of Ireland was estimated at 1,034,000. According to the returns in 1821, it had increased to the prodigious amount of 6,846,949;¹³ and it is thought that when the deficiencies have been supplied by the final returns of the enumerators, it will be upwards of seven millions. This is an example of an actual increase for 125 years together, at a rate which would double the population in about forty-five years; and this has taken place under the frequent pressure of great distress among the labouring classes of society, and the practice of frequent and considerable emigration.

But for the proof of the power of population to increase under great obstacles of the preventive, as well as of the positive kind, we need not go out of Great Britain. The rate of increase since our enumerations have commenced has been very remarkable for a country which was considered as well peopled before, and some of the details accompanying the returns tend strikingly to illustrate the

principle of population.

The population of Great Britain, according to the enumerations of 1821 and 1811, was, respectively, 10,942,646; and 12,596,803.¹⁴ This is a rate of increase, during the ten years, of rather above fifteen per cent., a rate which, if continued, would double the population in between forty-nine and fifty years.

By the enumeration of 1821, it appears that the population was 14,391,631,¹⁵ which, compared with the population of 1811, gives a rate of increase during the ten years of 14.25 per cent., a rate which would double the population in about fifty-two years.

According to these numbers, the rate of increase during the last ten years was slower than that of the first; but it appears, from the excess of the number of males above females in the enumeration of 1811, so opposite to the state of the population in 1801 and 1821, when the females exceeded the males, particularly at the latter period, that of the large number added to the population for the army, navy, and registered merchant ships in 1811, a considerable proportion must have been foreigners. On this account, and on account of the further difficulty of knowing what part of this number might properly belong to Ireland, it has been proposed to estimate the rate per cent. at which the population has increased in each of the ten years by the females only; and, according to this mode of computation, the population increased during the first period at the rate of 14.02 per cent., and during the second at the rate of 15.82. (Preliminary Observations, p. 8.) This last rate of increase would double the population in less than forty-eight years.

The only objection to this mode of computation is, that it does not take into consideration the greater destruction of the males during the war. In 1801, the females exceeded the half of the population by 21,031, and in 1821 by 63,890, while, at the intermediate period, owing to the causes above mentioned, the females fell short of the half of the males by 35,685.

When, however, a proper distribution has been made of the army and navy among the resident population, and taking England and Wales alone, it appears that from 1801 to 1811 the population increased at the rate of fourteen and a half per cent., and from 1811 to 1821, at the rate of sixteen and one third per cent. (Preliminary Observations, p. 32.) At the former of these rates, the period of doubling would be rather above fifty years; at the latter, under forty-six years; and, taking the whole period, the time of doubling would be about forty-eight years. Yet in Great Britain there is a much larger proportion of the population living in towns, and engaged in occupations considered as unhealthy, than in any other known country of the same extent. There are also the best reasons for believing that in no other country of the same extent is there to be found so great a proportion of late marriages, or so great a proportion of persons remaining unmarried, as in Great Britain. It is further known that

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the number of emigrants from Great Britain greatly exceed those who come into the country. And if, under these circumstances, a demand for labour and an increase of the funds for its maintenance could for twenty years together occasion such a rate of increase as, if continued, would double the population in forty-eight years, and quadruple it in ninety-six years, it is in the highest degree probable, that if the encouragements to marriage and the means of supporting a family were as great as in America, the period of doubling in Great Britain would not be more than twenty-five years, even in spite of her great towns and manufactories; and would be decidedly less if these obstacles were removed.

Taking therefore into consideration the actual rate of increase which appears from the best documents to have taken place over a very large extent of country in the United States of America, very variously circumstanced as to healthiness and rapidity of progress; considering, further, the rate of increase which has taken place in New Spain, and also in many countries of Europe, where the means of supporting a family, and other circumstances favourable to increase, bear no comparison with those of the United States; and adverting particularly to the great increase of population which has taken place in this country during the last twenty years, under the formidable obstacles to its progress which must press themselves upon the attention of the most careless observer; it must appear, that the assumption of a rate of increase such as would double the population in twenty-five years, as representing the natural progress of population, when not checked by the difficulty of procuring the means of subsistence, or other peculiar causes of premature mortality, must be very decidedly within the truth.

It may be safely asserted, therefore, that population, when unchecked, increases in a geometrical progression of such a nature as to double itself every twenty-five years.

It would be unquestionably desirable to have the means of comparing the natural rate of the increase of population when unchecked, with the possible rate of the increase of food, in a limited territory, such as that in which man is actually placed; but the latter estimate is much more difficult and uncertain than the former. If the rate of the increase of population at a particular period of some little extent can be ascertained with tolerable exactness, we have only to suppose the continuance of the same encouragements to marriage, the same facility of supporting a family, the same moral habits, with the same rate of mortality; and the increase of the population at the same rate, after it had reached a thousand millions, would be just as probable as at any intermediate and earlier period; but it is quite obvious that the increase of food in a limited space must proceed upon a principle totally different. It has been already stated, that while land of good quality is in great abundance, the rate at which food

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might be made to increase would far exceed what is necessary to keep pace with the most rapid increase of population which the laws of nature in relation to human kind permit. But if society were so constituted as to give the fullest scope possible to the progress of cultivation and population, all such lands, and all lands of moderate quality, would soon be occupied; and when the future increase of the supply of food came to depend upon the taking of very poor land into cultivation, and the gradual and laborious improvement of the land already cultivated, the rate of the increase of food would certainly have a greater resemblance to a decreasing geometrical ratio than an increasing one. The yearly increment of food would, at any rate, have a constant tendency to diminish, and the amount of the increase of each successive ten years would probably be less than that of the preceding.

Practically, however, great uncertainty must take place. An unfavourable distribution of produce, by prematurely diminishing the demand for labour, might retard the increase of food at an early period, in the same manner as if cultivation and population had been further advanced; while improvements in agriculture, accompanied by a great demand for labour and produce, might for some time occasion a rapid increase of food and population at a later period, in the same manner as if cultivation and population had been in an earlier stage of their progress. These variations, however, obviously arise from causes which do not impeach the general tendency of a continued increase of produce in a united territory to diminish the power of its increase in future.

Under this certainty with regard to the general tendency, and uncertainty in reference to particular periods, it must be allowable, if it throws light on the subject, to make a supposition respecting the increase of food in a limited territory, which, without pretending to accuracy, is clearly more favourable to the power of the soil to produce the means of subsistence for an increasing population, than any experience which we have of its qualities will warrant.

If, setting out from a tolerably well-peopled country, such as England, France, Italy, or Germany, we were to suppose that, by great attention to agriculture, its produce could be permanently increased every twenty-five years by a quantity equal to that which it at present produces, it would be allowing a rate of increase decidedly beyond any probability of realization. The most sanguine cultivators could hardly expect that, in the course of the next two hundred years, each farm in this country on an average would produce eight times as much food as it produces at present, and still less that this rate of increase could continue, so that each farm would produce twenty times as much as at present in five hundred years, and forty times as much in a thousand years. Yet this would be but an arithmetical progression, and would fall short, beyond all comparison, of the natural increase of population in a geometrical progression, ac-

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according to which the inhabitants of any country, in five hundred years, instead of increasing to twenty times, would increase to above a million times their present numbers.

It will be said, perhaps, that many parts of the earth are as yet very thinly peopled, and, under proper management, would allow of a much more rapid increase of food than would be possible in the more fully inhabited states of Europe. This is unquestionably true. Some parts of the earth would no doubt be capable of producing food at such a rate as to keep pace for a few periods with an unrestricted increase of population. But to put this capacity fully into action, is of all things the most difficult. If it is to be accomplished by the improvement of the actual inhabitants of the different parts of the earth in knowledge, in government, in industry, in arts, and in morals, it is scarcely possible to say how it ought to be commenced with the best prospect of success, or to form a conjecture as to the time in which it could be effected.

If it is to be accomplished by emigration from the more improved parts of the world, it is obvious that it must involve much war and extermination; besides all the difficulties usually attendant upon new settlements in uncivilized countries; and these alone are so formidable, and for a long time so destructive, that, combined with the unwillingness which people must always naturally feel to quit their own country, much distress would be suffered at home before relief would be sought for in emigration.

But, supposing for a moment that the object could be fully accomplished, that is, supposing that the capacity of the earth to produce the necessaries of life could be put fully into action, and that they were distributed in the proportions most favourable for the growth of capital and the effective demand for labour, the increase of population, whether arising from the increase of the inhabitants of each country, or from emigrants issuing from all those countries which were more advanced in cultivation, would be so rapid, that, in a period comparatively quite short, all the good lands would be occupied, and the rate of the possible increase of food would be reduced much below the arithmetical ratio above supposed.

If, merely during the short period which has elapsed since our Revolution of 1688, the population of the earth had increased at its natural rate when unchecked, supposing the number of people at that time to have been only eight hundred millions, all the land of the globe, without making allowance for deserts, forests, rocks, and lakes, would on an average be equally populous with England and Wales at present. This would be accomplished in five doublings, or a hundred and twenty-five years; and one or two doublings more, or a period less than that which has elapsed since the beginning of the reign of James I., would produce the same effect from the overflowings of the inhabitants of those countries where, owing to the further progress of cultivation, the soil had not the capacity of pro-

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ducing food so as to keep pace with the increase of an unrestricted population.

Whatever temporary and partial relief, therefore, may be derived from emigration by particular countries in the actual state of things, it is quite obvious, that, considering the subject generally and largely, emigration may be fairly said not in any degree to touch the difficulty. And, whether we exclude or include emigration, whether we refer to particular countries, or to the whole earth, the supposition of a future capacity in the soil to increase the necessaries of life every twenty-five years by a quantity equal to that which is at present produced, must be decidedly beyond the truth.

But if the natural increase of population, when unchecked by the difficulty of procuring the means of subsistence, or other peculiar causes, be such as to continue doubling its numbers in twenty-five years; and the greatest increase of food, which, for a continuance, could possibly take place on a limited territory like our earth in its present state, be at the most only such as would add every twenty-five years an amount equal to its present produce; it is quite clear that a powerful check on the increase of population must be almost constantly in action.

By the laws of nature man cannot live without food. Whatever may be the rate at which population would increase if unchecked, it never can actually increase in any country beyond the food necessary to support it. But, by the laws of nature in respect to the powers of a limited territory, the additions which can be made in equal periods to the food which it produces must, after a short time, either be constantly decreasing, which is what would really take place; or, at the very most, must remain stationary, so as to increase the means of subsistence only in an arithmetical progression. Consequently, it follows necessarily that the average rate of the actual increase of population over the greatest part of the globe, obeying the same laws as the increase of food, must be totally of a different character from the rate at which it would increase if *unchecked*.

The great question, then, which remains to be considered, is the manner in which this constant and necessary check upon population practically operates.

If the soil of any extensive well-peopled country were equally divided amongst its inhabitants, the check would assume its most obvious and simple form. Perhaps each farm in the well-peopled countries of Europe might allow of one, or even two doublings, without much distress, but the absolute impossibility of going on at the same rate is too glaring to escape the most careless thinker. When, by extraordinary efforts, provision had been made for four times the number of persons which the land can support at present, what possible hope could there be of doubling the provision in the next twenty-five years?

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Yet there is no reason whatever to suppose that any thing besides the difficulty of procuring in adequate plenty the necessaries of life, should either indispose this greater number of persons to marry early, or disable them from rearing in health the largest families. But this difficulty would of necessity occur, and its effect would be either to discourage early marriages, which would check the rate of increase by preventing the same proportion of births; or to render the children unhealthy from bad and insufficient nourishment, which would check the rate of increase by occasioning a greater proportion of deaths; or, what is most likely to happen, the rate of increase would be checked, partly by the diminution of births, and partly by the increase of mortality.

The first of these checks may, with propriety, be called the *preventive check* to population; the second, the *positive check*; and the absolute necessity of their operation in the case supposed is as certain and obvious as that man cannot live without food.

Taking a single farm only into consideration, no man would have the hardihood to assert that its produce could be made permanently to keep pace with a population increasing at such a rate as it is observed to do for twenty or thirty years together at particular times and in particular countries. He would, indeed, be compelled to acknowledge, that if, with a view to allow for the most sanguine speculations, it has been supposed that the additions made to the necessaries produced by the soil in given times might remain constant, yet that this rate of the increase of produce could not possibly be realized; and that, if the capacity of the soil were at all times put properly into action, the additions to the produce would, after a short time, and independently of new inventions, be constantly decreasing, till, in no very long period, the exertions of an additional labourer would not produce his own subsistence.

But what is true in this respect in reference to a single farm, must necessarily be true of the whole earth, from which the necessaries of life for the actual population are derived. And what would be true in respect to the checks to population if the soil of the earth were equally divided among the different families which inhabit it, must be true under the present unequal division of property and variety of occupations. Nothing but the confusion and indistinctness arising from the largeness of the subject, and the vague and false notions which prevail respecting the efficacy of emigration, could make persons deny in the case of an extensive territory or the whole earth, what they could not fail to acknowledge in the case of a single farm, which may be said fairly to represent it.

It may be expected, indeed, that in civilized and improved countries the accumulation of capital, the division of labour, and the invention of machinery, will extend the bounds of production; but we know from experience that the effects of these causes, which are quite astonishing in reference to some of the conveniences and lux-

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uries of life, are very much less efficient in producing an increase of food; and although the saving of labour and an improved system of husbandry may be the means of pushing cultivation upon much poorer lands than could otherwise be worked, yet the increased quantity of the necessaries of life so obtained can never be such as to supersede, for any length of time, the operation of the preventive and positive checks to population. And not only are these checks as absolutely necessary in civilized and improved countries, as they would be if each family had a certain portion of land allotted to it, but they operate almost exactly in the same way. The distress which would obviously arise in the most simple state of society, from the natural tendency of population to increase faster than the means of subsistence in a limited territory, is brought home to the higher classes of an improved and populous country, in the difficulty which they find in supporting their families in the same rank of life with themselves; and to the labouring classes, which form the great mass of society, in the insufficiency of the real wages of common labour to bring up a large family.

If in any country the yearly earnings of the commonest labourers, determined, as they always will be, by the state of the demand and the supply of necessaries compared with labour, be not sufficient to bring up in health the largest families, one of the three things before stated must happen; either the prospect of this difficulty will prevent some and delay other marriages; or the diseases arising from bad nourishment will be introduced, and the mortality be increased; or the progress of population will be retarded, partly by one cause and partly by the other.

According to all past experience, and the best observations which can be made on the motives which operate upon the human mind, there can be no well-founded hope of obtaining a large produce from the soil, but under a system of private property. It seems perfectly visionary to suppose that any stimulus short of that which is excited in man by the desire of providing for himself and family, and of bettering his condition in life, should operate on the mass of society with sufficient force and constancy to overcome the natural indolence of mankind. All the attempts which have been made since the commencement of authentic history to proceed upon a principle of common property, have either been so insignificant that no inference can be drawn from them, or have been marked by the most signal failures; and the changes which have been effected in modern times by education do not seem to advance a single step towards making such a state of things more probable in future. We may therefore safely conclude, that while man retains the same physical and moral constitution which he is observed to possess at present, no other than a system of private property stands the least chance of providing for such a large and increasing population as that which is to be found in many countries at present.

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But though there is scarcely any conclusion which seems more completely established by experience than this, yet it is unquestionably true that the laws of private property, which are the grand stimulants to production, do themselves so limit it, as always to make the actual produce of the earth fall very considerably short of the *power* of production. On a system of private property no adequate motive to the extension of cultivation can exist, unless the returns are sufficient, not only to pay the wages necessary to keep up the population, which, at the least, must include the support of a wife and two or three children, but also afford a profit on the capital which has been employed. This necessarily excludes from cultivation a considerable portion of land, which might be made to bear corn. If it were possible to suppose that man might be adequately stimulated to labour under a system of common property, such land might be cultivated, and the production of food and the increase of population might go on, till the soil absolutely refused to grow a single additional quarter, and the whole of the society was exclusively engaged in procuring the necessaries of life. But it is quite obvious that such a state of things would inevitably lead to the greatest degree of distress and degradation. And if a system of private property secures mankind from such evils, which it certainly does in a great degree, by securing to a portion of the society the leisure necessary for the progress of the arts and sciences, it must be allowed that such a check to the increase of cultivation confers on society a most signal benefit.

But it must perhaps also be allowed, that, under a system of private property, cultivation is sometimes checked in a degree and at a period not required by the interest of society. And this is particularly likely to happen when the original divisions of land have been extremely unequal, and the laws have not given sufficient facility to a better distribution of them. Under a system of private property, the only effectual demand for produce must come from the owners of property; and though it be true that the effectual demand of the society, whatever it may be, is best supplied under the most perfect system of liberty, yet it is not true that the tastes and wants of the effective demanders are always, and necessarily, the most favourable to the progress of national wealth. A taste for hunting and the preservation of game among the owners of the soil will, without fail, be supplied, if things be allowed to take their natural course; but such a supply, from the manner in which it must be effected, would inevitably be most unfavourable to the increase of produce and population. In the same manner, the want of an adequate taste for the consumption of manufactured commodities among the possessors of surplus produce, if not fully compensated by a great desire for personal attendance, which it never is, would infallibly occasion a premature slackness in the demand for labour and produce, a premature fall of profits, and a check to cultivation.

It makes little difference in the actual rate of the increase of

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population, or the necessary existence of checks to it, whether that state of demand and supply which occasions an insufficiency of wages to the whole of the labouring classes be produced prematurely by a bad structure of society and an unfavourable distribution of wealth, or necessarily by the comparative exhaustion of the soil. The labourer feels the difficulty nearly in the same degree, and it must have nearly the same results, from whatever cause it arises; consequently, in every country with which we are acquainted, where the yearly earnings of the labouring classes are not sufficient to bring up in health the largest families, it may be safely said that population is actually checked by the difficulty of procuring the means of subsistence. And, as we well know that ample wages, combined with full employment for all who choose to work, are extremely rare, and scarcely ever occur, except for a certain time, when the knowledge and industry of an old country is applied, under favourable circumstances, to a new one; it follows that the pressure arising from the difficulty of procuring subsistence is not to be considered as a remote one, which will be felt only when the earth refuses to produce any more, but as one which not only actually exists at present over the greatest part of the globe, but, with few exceptions, has been almost constantly acting upon all the countries of which we have any account.

It is unquestionably true, that, in no country of the globe have the government, the distribution of property, and the habits of the people, been such as to call forth, in the most effective manner, the resources of the soil. Consequently, if the most advantageous possible change in all these respects could be supposed at once to take place, it is certain that the demand for labour and the encouragement to production might be such as for a short time in some countries, and for rather a longer in others, to lessen the operation of the checks to population which have been described. It is specifically this truth constantly obtruding itself upon our attention which is the great source of delusion on this subject, and creates the belief that man could always produce from the soil much more than sufficient to support himself and family. In the actual state of things this power has perhaps always been possessed. But for it we are indebted wholly to the ignorance and bad government of our ancestors. If they had properly called forth the resources of the soil, it is quite certain that we should now have but scanty means left of further increasing our food. If merely since the time of William the Conqueror all the nations of the earth had been well governed, and if the distribution of property, and the habits both of the rich and the poor, had been the most favourable to the demand for produce and labour, though the amount of food and population would have been prodigiously greater than at present, the means of diminishing the checks to population would unquestionably be less. That difficulty in procuring the necessaries of life which is now felt in the comparatively low

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wages of labour almost all over the world, and is occasioned partly by the necessary state of the soil, and partly by a premature check to the demand for produce and labour, would then be felt in a greater degree, and would less admit of any relaxation in the checks to population, because it would be occasioned wholly and necessarily by the state of the soil.

It appears, then, that what may be called the proportionate amount of the necessary checks to population depends very little upon the efforts of man in the cultivation of the soil. If these efforts had been directed from the first in the most enlightened and efficient manner, the checks necessary to keep the population on a level with the means of subsistence, so far from being lightened, would in all probability be operating with greater force; and the condition of the labouring classes, so far as it depends on the facility of procuring the means of subsistence, instead of being improved, would in all probability be deteriorated.

It is to the laws of nature, therefore, and not to the conduct and institutions of man, that we are to attribute the necessity of a strong check on the natural increase of population.

But though the laws of nature which determine the rate at which population would increase if unchecked, and the very different rate at which the food required to support population could be made to increase in a limited territory, are undoubtedly the causes which render necessary the existence of some great and constant check to population, yet a vast mass of responsibility remains behind on man and the institutions of society.

In the first place, they are certainly responsible for the present scanty population of the earth. There are few large countries, however advanced in improvement, the population of which might not have been doubled or tripled, and there are many which might be ten, or even a hundred times as populous, and yet all the inhabitants be as well provided for as they are now, if the institutions of society and the moral habits of the people had been for some hundred years the most favourable to the increase of capital, and the demand for produce and labour.

Secondly, though man has but a trifling and temporary influence in altering the proportionate amount of the checks to population, or the degree in which they press upon the actual numbers, yet he has a great and most extensive influence on their character and mode of operation.

It is not in superseding the necessity of checks to population, in the progress of mankind to the full peopling of the earth (which may with truth be said to be a physical impossibility), but in directing these checks in such a way as to be the least prejudicial to the virtue and happiness of society, that government and human institutions produce their great effect. Here we know, from constant experience, that they have great power. Yet even here it must be allowed that the

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power of government is rather indirect than direct, as the object to be attained depends mainly upon such a conduct on the part of individuals as can seldom be directly enforced by laws, though it may be powerfully influenced by them.

This will appear if we consider more particularly the nature of those checks which have been classed under the general heads of Preventive and Positive.

It will be found that they are all resolvable into *moral restraint*, *vice*, and *misery*. And if, from the laws of nature, some check to the increase of population be absolutely inevitable, and human institutions have any influence upon the extent to which each of these checks operates, a heavy responsibility will be incurred, if all that influence, whether direct or indirect, be not exerted to diminish the amount of vice and misery.

Moral restraint, in application to the present subject, may be defined to be, abstinence from marriage, either for a time or permanently, from prudential considerations, with a strictly moral conduct towards the sex in the interval. And this is the only mode of keeping population on a level with the means of subsistence, which is perfectly consistent with virtue and happiness. All other checks, whether of the preventive or the positive kind, though they may greatly vary in degree, resolve themselves into some form of vice or misery.

The remaining checks of the preventive kind, are the sort of intercourse which renders some of the women of large towns unprolific; a general corruption of morals with regard to the sex, which has a similar effect; unnatural passions, and improper arts to prevent the consequences of irregular connections. These evidently come under the head of vice.

The positive checks to population include all the causes which tend in any way prematurely to shorten the duration of human life; such as unwholesome occupations, severe labour and exposure to the seasons, bad and insufficient food and clothing, arising from poverty, bad nursing of children, excesses of all kinds, great towns and manufactories, the whole train of common diseases and epidemics, wars, infanticide, plague, and famine. Of these positive checks, those which appear to arise from the laws of nature may be called exclusively misery; and those which we bring upon ourselves, such as wars, excesses of all kinds, and many others, which it would be in our power to avoid, are of a mixed nature. They are brought upon us by vice, and their consequences are misery.

Some of these checks in various combinations and operating with various force, are constantly in action in all the countries with which we are acquainted, and form the immediate causes which keep the population on a level with the means of subsistence.

Mr Malthus in his work on this subject, has taken a view of the checks of population in most of the countries of which we have the best accounts. His object was evidently to trace in each country

those checks which appeared to be most effective in repressing population; and to endeavour to answer the question generally which had been applied particularly to New Holland by Captain Cook, namely, By what means is the population of this country kept down to the number which it can subsist?

It was hardly to be expected, however, that the general accounts of countries which are to be met with should contain a sufficient number of details of the kind required to enable us to ascertain what portion of the natural increase of population each individual check which could be traced had the power to overcome. In particular, it was not to be expected, that any accounts could inform us of the degree in which moral restraint prevails when taken in its strictest sense. It is necessary, therefore, to attend chiefly to the greater or smaller number of persons who remain unmarried, or marry late; and the delay of marriage, owing to the difficulty of providing for a family, when the degree of irregularity to which it may lead cannot be ascertained, may be usefully called the prudential restraint on marriage and population. And this will be found to be the chief mode in which the preventive check practically operates.

But if the preventive check to population, that check which can alone supersede great misery and mortality, operates chiefly by a prudential restraint on marriage, it will be obvious, as was before stated, that direct legislation cannot do much. Prudence cannot be enforced by laws, without a great violation of natural liberty, and a great risk of producing more evil than good. But still the very great influence of a just and enlightened government, and the perfect security of property in creating habits of prudence, cannot for a moment be questioned. The principal causes and effects of these habits are thus stated in Mr Malthus's last work.¹⁶

"From high wages, or the power of commanding a large portion of the necessities of life, two very different results may follow; one, that of a rapid increase of population, in which case the high wages are chiefly spent in the maintenance of large and frequent families; and the other, that of a decided improvement in the modes of subsistence, and the conveniences and comforts enjoyed, without a proportionate acceleration in the rate of increase.

"In looking to these different results, the causes of them will evidently appear to be the different habits existing among the people of different countries, and at different times. In an inquiry into the causes of these different habits, we shall generally be able to trace those which produce the first result to all the circumstances which contribute to depress the lower classes of the people, which make them unable or unwilling to reason from the past to the future, and ready to acquiesce, for the sake of present gratification, in a very low standard of comfort and respectability; and those which produce the second result, to all the circumstances which tend to elevate the character of the lower classes of society, which make them approach

the nearest to beings who ‘look before and after,’ and who, consequently, cannot acquiesce patiently in the thought of depriving themselves and their children of the means of being respectable, virtuous, and happy.

“Among the circumstances which contribute to the character first described, the most efficient will be found to be despotism, oppression, and ignorance; among those which contribute to the latter character, civil and political liberty, and education.

“Of all the causes which tend to encourage prudential habits among the lower classes of society, the most essential is unquestionably civil liberty. No people can be much accustomed to form plans for the future, who do not feel assured that their industrious exertions, while fair and honourable, will be allowed to have free scope; and that the property which they either possess or may acquire will be secured to them by a known code of just laws impartially administered. But it has been found by experience, that civil liberty cannot be permanently secured without political liberty; consequently political liberty becomes almost equally essential, and, in addition to its being necessary in this point of view, its obvious tendency to teach the lower classes of society to respect themselves, by obliging the higher classes to respect them, must contribute greatly to all the good effects of civil liberty.”

“With regard to education, it might certainly be made general under a bad form of government, and might be very deficient under one in other respects good; but it must be allowed that the chances, both with regard to its quality and its prevalence, are greatly in favour of the latter. Education alone could do little against insecurity of property; but it would powerfully assist all the favourable consequences to be expected from civil and political liberty, which could not indeed be considered as complete without it.”

The varying prevalence of these habits, owing to the causes above referred to, combined with the smaller or greater mortality occasioned by other customs, and the varying effects of soil and climate, must necessarily produce great differences in different countries, and at different periods, in the character of the predominant checks to population, and the force of each. And this inference, which inevitably follows from theory, is fully confirmed by experience.

It appears, for instance, from the accounts we have received of ancient nations, and of the less civilized parts of the world, that war and violent diseases were the predominant checks to their population. The frequency of wars, and the dreadful devastations of mankind occasioned by them, united with the plagues, famines, and mortal epidemics of which there are records, must have caused such a consumption of the human species, that the exertion of the utmost power of increase must, in many cases, have been insufficient to supply it; and we see at once the source of those encouragements to

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marriage, and efforts to increase population, which, with inconsiderable exceptions, distinguished the legislation and general policy of ancient times. Yet there were some few men of more extended views, who, when they were looking to the settlement of a society in a more improved state, were fully aware, that under the most beautiful form of government which their imagination could conceive, the greatest poverty and distress might be felt from a too rapid increase of population. And the remedies which they proposed were strong and violent in proportion to the greatness of the evil which they apprehended. Even the practical legislators who encouraged marriage, seemed to think that the supplies of children might sometimes follow too rapidly for the means of supporting them; and it appears to have been with a view to provide against this difficulty, and of preventing it from discouraging marriage, that they frequently sanctioned the inhuman practice of infanticide.

Under these circumstances, it is not to be supposed that the prudential restraint on marriage should have operated to any considerable extent. Except in a few cases where a general, corruption of morals prevailed, which might act as a preventive check of the most vicious kind, a large portion of the procreative power was called into action, the occasional redundancy from which was checked by violent causes. These causes will be found resolvable almost wholly into vice and misery; the first of which, and a large portion of the second, it is always in the power of man to avoid.

In a review of the checks to population in the different states of modern Europe, it appears that the positive checks to population have prevailed less, and the preventive checks more, than in ancient times, and in the more uncultivated parts of the world. The destruction occasioned by war has unquestionably abated, both on account of its occurring, on the whole, less frequently, and its ravages not being so fatal, either to man or the means of his support, as they were formerly. And although, in the earlier periods of the history of modern Europe, plagues, famines, and mortal epidemics were not unfrequent, yet, as civilization and improvement have advanced, both their frequency and their mortality have been greatly reduced, and in some countries they are now almost unknown. This diminution of the positive checks to population, as it has been certainly much greater in proportion than the actual increase of food and population, must necessarily have been accompanied by an increasing operation of the preventive checks; and probably it may be said with truth, that in almost all the more improved countries of modern Europe, the principal check which at present keeps the population down to the level of the actual means of subsistence, is the prudential restraint on marriage.

Yet in comparing together the accounts and registers of the different countries of modern times, we shall still find a vast difference in the character and force of the checks which are mainly in action;

and it is precisely in this point of view that these accounts afford the most important instruction. Some parts of Europe are yet in an unimproved state, and are still subject to frequent plagues and mortal epidemics. In these countries, as might be expected, few traces are to be found of the prudential restraint on marriage. But even in improved countries, the circumstances may be such as to occasion a great mortality. Large towns are known to be unfavourable to health, particularly to the health of young children; and the unwholesomeness of marshy situations may be such as in some cases to balance the principle of increase, even when nearly the whole of the procreative power is called into action, which is seldom the case in large towns.

Thus, in the registers of twenty-two Dutch villages given by Süssmilch,¹⁷ and quoted by Mr Malthus, the mortality (occasioned, as may be supposed, chiefly by the natural unhealthiness of the country) was as high as one in twenty-two or twenty-three, instead of the more common proportion of one in thirty-five or forty; and the consequence was, that the marriages, instead of being in the usual proportion of one in about 108 of the population, were in the extraordinary high proportion of one in sixty-four;¹⁸ showing a most unusual frequency of marriage, while, on account of the great mortality, the number of inhabitants was nearly stationary, and the births and deaths about equal.

On the other hand, in Norway, where the climate and modes of living seem to be extremely favourable to health, and the mortality was only one in forty-eight, the prudential restraint on marriage was called more than usually into action, and the marriages were only one in 130 of the population.

These may be considered as extreme cases, but the same result in different degrees is observable in the registers of all countries; and it is particularly to be remarked, that in those countries where registers of births, deaths, and marriages have been kept for a considerable time, the progressive diminution of mortality occasioned by the introduction of habits more favourable to health, and the consequent diminution of plagues and mortal epidemics, have been accompanied invariably by a smaller proportion of marriages and births. Süssmilch has given some striking instances of the gradual diminution in the proportion of the number of marriages during a part of the last century.³

In the town of Leipsic, in the year 1620, the annual marriages were to the population as 1 to 82; from the year 1741 to 1766, they were as 1 to 120.

In Augsburg, in 1510, the proportion of marriages to the population was 1 in 86; in 1750 as 1 to 123.

In Dantzic, in the year 1705, the proportion was as 1 to 89; in 1745, as 1 to 118.

In the dukedom of Magdeburg, in 1700, the proportion was as 1

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to 87; from 1752 to 1755, as 1 to 125.

In the principality of Halberstadt, in 1690, the proportion was as 1 to 88; in 1756, as 1 to 112.

In the dukedom of Cleves, in 1705, the proportion was as 1 to 83; in 1755, as 1 to 100.

In the churmark of Brandenburg, in 1700, the proportion was as 1 to 76; and in 1755, as 1 to 108.

Instances of this kind are numerous, and they tend to show the dependence of the marriages on the deaths in all old countries. A greater mortality almost invariably produces a greater number of marriages; and it must be equally certain, that except where the means of subsistence can be adequately increased, a greater proportion of marriages must occasion a greater mortality.

The proportion of yearly births to the whole population must evidently depend principally on the proportion of marriages; and it appears, consequently, from registers, that in countries which will not admit of any considerable increase of population, the births, as well as the marriages, are mainly influenced by the deaths. When an actual decrease of population is not taking place, the births will always supply the vacancies made by death, and exactly so much more as the increasing wealth of the country and the demand for labour will admit. Everywhere in the intervals of plagues, epidemics, and destructive wars, the births considerably exceed the deaths; but while from these and other causes the mortality in different countries is extremely various, it appears from registers that, with the exception above stated, the births vary in the same proportion.¹⁹

Thus, in 39 villages of Holland, where the deaths, at the time to which the registers refer, were about 1 in 23, the births were also 1 in 23. In 15 villages round Paris, the births bore the same or even a greater proportion to the whole population, on account of a still greater mortality, the births being 1 in $22\frac{7}{10}$ ths, and the deaths the same. In the small towns of Brandenburg, which were in an increasing state, the mortality was 1 in 29, and the births 1 in $24\frac{7}{10}$ ths. In Sweden, where the mortality was about 1 in $34\frac{1}{2}$ the births were 1 in 28. In 1056 villages of Brandenburg, in which the mortality was about 1 in 39 or 40, the births were about 1 in 30. In Norway, where the mortality was 1 in 48, the births were 1 in 34.

In all these instances the births are evidently measured by the deaths, after making a proper allowance for the excess of births which the state of each country will admit. In such a country as Russia, this allowance must be great; as, although the mortality might perhaps be taken as low as 1 in 48 or 50, the births were as high as 1 in 26, owing to the increasing resources of the country, which admit of a rapid increase of the population.

Of all the countries which Mr Malthus has reviewed, there is none which so strikingly illustrates the most important fact of the dependence of the proportions of marriages and births on the

deaths, and the general principles of population, as Switzerland. It appears, that between 1760 and 1770, an alarm prevailed respecting the continued depopulation of the country; and, to ascertain the point, M. Muret, minister of Vevay, made a very laborious and careful search into the registers of different parishes from the time of their first establishment. He compared the number of births which had taken place during three different periods of seventy years each, the first ending in 1620, the second in 1690, and the third in 1760. And finding by this comparison, that the number of births was less in the second period than in the first, and less in the third period than in the second, he considered the evidence of a continued depopulation of the country from the year 1550 as incontrovertible.²⁰ But the accounts which he himself produces clearly show, that, in the earlier periods to which he refers, the mortality was very much greater than in the latter; and that the greater *number* of births found in the registers formerly, was not owing to a greater population, but to the greater *proportion* of births which always accompanies a greater mortality.

It appears from accounts which are entirely to be depended on, that during the last period the mortality was extraordinarily small, and the proportion of children reared from infancy to puberty extraordinarily great. At the time when M. Muret wrote his paper, in 1766, the proportion of deaths to the population in the Pays de Vaud was 1 in 45, of births 1 in 36, and of marriages 1 in 140. These are all very small proportions of births, deaths, and marriages, compared with other countries; but the state of things must have been totally different in the sixteenth and seventeenth centuries. M. Muret gives a list of all the plagues which had prevailed in Switzerland from 1520, from which it appears that this dreadful scourge desolated the country at short intervals during the whole of the first period, and extended its occasional ravages to within twenty-two years of the termination of the second. We may safely conclude, that, in these times, the average mortality was very much greater than at present. But what puts the question beyond a doubt, is the great mortality which prevailed in the neighbouring town of Geneva in the sixteenth century, and its gradual diminution in the seventeenth and eighteenth. It appears from calculations, published in the *Bibliothèque Britannique* (tom. iv. p. 328), that in the sixteenth century the probability of life, or the age to which half of the born lived, was only 4.883, or under four years and eleven months; and the mean life, or the average number of years due to each person, 18.511, or about eighteen years and a half. In the seventeenth century, the probability of life in Geneva was 11.607, about eleven years and seven months; the mean life 23.358, or twenty three years and four months. In the eighteenth century, the probability of life had increased to 27.183, twenty-seven years and two months; and the mean life to thirty-two years and two months.

There can be no doubt, from the prevalence of the plague, and its gradual extinction, as noticed by M. Muret, that a diminution of mortality of the same kind, though not perhaps to the same extent, must have taken place in Switzerland; but if, with a mortality which could not have been less than one in thirty or thirty-two, the proportion of births had been what it was when M. Muret wrote, it is quite evident that the country would have been rapidly depopulated. But as it is known, from the actual amount of births found in the registers, that this was not the case, it follows as a necessary consequence, that the greater mortality of former times was accompanied by a greater proportion of births. And this at once shows the error of attempting to determine the actual population, either of different countries, or of different periods in the same country, by the amount of the births; and the strong tendency of population to fill up all vacancies, and very rarely to be limited by any other cause than the difficulty of supporting a family.

Switzerland and the Pays de Vaud afford other most striking instances of the dependence of the births on the deaths; and the accounts of them are perhaps more to be depended upon, as they appear to contradict the preconceived opinions of the person who collected them.

Speaking of the want of fruitfulness in the Swiss women, M. Muret says, that Prussia, Brandenburg, Sweden, France, and indeed every country the registers of which he had seen, give a greater proportion of baptisms to the number of inhabitants than the Pays de Vaud, where this proportion is only as 1 to 36. He adds, that from calculations lately made in the Lyonnois, it appeared that in Lyons itself the proportion of baptisms was 1 in 28, in the small towns 1 in 25, and in the villages 1 in 23 or 24. What a prodigious difference, he exclaims, between the Lyonnois and the Pays de Vaud, where the most favourable proportion, and that only in two small parishes of extraordinary fecundity, is not above 1 in 26, and in many parishes it is considerably less than 1 in 40. The same difference, he remarks, takes place in the mean life. In the Lyonnois it is little above 25 years; while in the Pays de Vaud, the lowest mean life, and that only in a single marshy and unhealthy parish, is 29½ years, and in many places it is above 45 years.

“But whence comes it,” he says, “that the country where children escape the best from the dangers of infancy, and where the mean life, in whatever way the calculation is made, is higher than in any other, should be precisely that in which the fecundity is the smallest? How comes it, again, that, of all our parishes, the one which gives the mean life the highest should also be the one where the tendency to increase is the smallest?”²¹

To resolve this question, M. Muret says, “I will hazard a conjecture, which, however, I give only as such. Is it not that, in order to maintain in all places a proper equilibrium of population, God has

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wisely ordered things in such a manner as that the force of life in each country should be in the inverse ratio of its fecundity? In fact, experience verifies my conjecture. Leyzin, a village in the Alps, with a population of 400 persons, produces but a little above eight children a year. The Pays de Vaud, in general, in proportion to the same number of inhabitants, produces eleven, and the Lyonnois sixteen. But if it happen, that at the age of twenty years, the eight, the eleven, and the sixteen are reduced to the same number, it will appear that the force of life gives in one place what fecundity does in another. And thus the most healthy countries, having less fecundity, will not over-people themselves, and the unhealthy countries, by their extraordinary fecundity, will be able to sustain their population."

These facts and observations are full of the most important instruction, and strikingly illustrate the principle of population. The three gradations in the proportions of births which are here so distinctly presented to our view, may be considered as representing that variety in the proportion of births which is known to take place in different countries and at different periods; and the practical question is, whether, when this variety prevails without a proportionate difference in the rate of increase, which is almost universally the case, we are to suppose, with M. Muret, that a special providence is called into action to render women less prolific in healthy countries, and where improved habits of cleanliness have banished plagues and mortal epidemics; or to suppose, as experience warrants, that the smaller mortality of healthy and improved countries is balanced by the greater prevalence of the prudential restraint on marriage and population.

The subject is seen with particular clearness in Switzerland, on account of the population of some of the districts being stationary. The number of inhabitants on the Alps was supposed to have diminished. This was probably an error; but it is not improbable that they should have remained stationary, or nearly so. There is no land so little capable of providing for an increasing population as mountainous pastures. When they have been once fully stocked with cattle, little more can be done; and if there be neither emigration to take off the superabundant numbers, nor manufactures wherewith to purchase an additional quantity of food, the deaths must equal the births.

This was the case with the Alpine parish of Leyzin before referred to, where, for a period of thirty years, the mortality and the proportion of births almost accurately kept pace with each other; and where, in consequence, if the positive checks to population had been unusually small, the preventive checks must have been unusually great. In the parish of Leyzin, according to M. Muret, the probability of life was as high as sixty-one years;²² but it is obvious that this extraordinary degree of healthiness could not *possibly* have taken

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place under the actual circumstances of the parish with respect to the means of subsistence, if it had not been accompanied by a proportionate action of the prudential restraint on marriage; and accordingly the subsisting marriages, being late and unprolific, yielded only one birth to every twelve; the births were only one in forty-nine, and the number of persons below sixteen was only one fourth of the population.

There can be little doubt that in the present case the extreme healthiness of the people, arising from their situation and employments, had more effect in producing the prudential check to population than the prudential check in producing the extreme healthiness; yet it is quite certain that they must constantly act and re-act upon each other, and that if, when the circumstances are such as to furnish no adequate means for the support of an increased population, and no relief in emigration, the prudential check does not prevail, no degree of natural healthiness could prevent an excessive mortality. Yet to occasion such a mortality, a much greater degree of poverty and misery must have taken place than in districts less favourably circumstanced with regard to health; and we see at once the reason why, in countries of mountainous pasture, if there be no vent in emigration, the necessity of the prudential check should be more strongly forced on the attention of the inhabitants, and should in consequence prevail to a greater degree.

Taking countries in general, there will necessarily be differences as to natural healthiness in all the gradations, from the most marshy habitable situations to the most pure and salubrious air. These differences will be further increased by the nature of the employments of the people, their habits of cleanliness, and their care in preventing the spread of epidemics. If in no country was there any difficulty in obtaining the means of subsistence, these different degrees of healthiness would make a great difference in the progress of population; and as there are many countries naturally more healthy than the United States of America, we should have instances of a more rapid increase than that which has there taken place. But as the actual progress of population is, with very few exceptions, determined by the relative difficulty of procuring the means of subsistence, and not by the relative natural powers of increase, it is found by experience that, except in extreme cases, the actual progress of population is little affected by unhealthiness or healthiness; but that these circumstances show themselves most powerfully in the character of the checks which keep the population down to the level of the means of subsistence, and occasion that sort of variety in the registers of different countries which was noticed in the instances mentioned by M. Muret.

Thus the population of two or three countries may be increasing at nearly the same rate, but one may be increasing chiefly from a great proportion of births, another from a small proportion of

deaths, and a third from a more common proportion of both, in which three different cases the structure of the population, and the registers of births, deaths, and marriages, will be essentially different.

The rate at which the population of Sweden and Norway was increasing, at the time referred to by Mr Malthus, was not far from the same; but their registers differed in almost all points. While the births in Sweden were 1 in 28 of the population, the births in Norway were only 1 in 34; while the marriages in Sweden were 1 in 112, in Norway they were only 1 in 130; and while the mortality in Sweden was 1 in 34½, in Norway it was only 1 in 48.²³ These different proportions of births, deaths, and marriages, must essentially alter the whole structure of the population. The proportion of persons living at different ages would be essentially different; the generations in one country would pass away sooner than the generations in the other; and Sweden might be said to increase principally from the large proportion of its births, and Norway from the small proportion of its deaths, or its small mortality.

A large proportion of births, when they have room to expand themselves, is the most powerful element of increase, and is absolutely necessary in order to effect the shortest period of doubling with which we are acquainted; but two countries may have nearly the same proportion of births, and yet the population of one be quite stationary, while the population of the other is increasing with the greatest known rapidity. The proportion of births in the Dutch villages first noticed approaches towards that of the United States of America; yet in the one case the population did not increase at all, and in the other it has increased so fast as to be taken as a specimen of the natural progress of population when interrupted by the fewest checks to which human society is subject. In this case, though the proportions of births and marriages to the whole population might not be very unlike, and possibly no very great difference might appear in the proportion of marriages to births, the other points in the registers would be in the opposite extremes. While the mortality in the Dutch villages was as high as 1 in 22, it would probably be 1 in 41, or less, in the United States. While the births and deaths in the Dutch villages were in the ratio of equality, in the United States they would be nearly in the proportion of 41 to 19.

In the same manner, two countries might have nearly the same mortality, and yet, in other points, be very different; and while one was increasing most rapidly, the other might be increasing very slowly. The proportion of deaths to the population in the Pays de Vaud is not very essentially different from that of the United States, but the proportion of births and the structure of the population present the most striking contrasts. The proportion of births for the whole of the Pays de Vaud was, according to M. Muret, 1 in 36, in many parishes it was considerably less than 1 in 40, and in one parish as low as 1 in 49; while, in the United States, it must be somewhere

between 1 in 19 and 1 in 20. The structure of the population was different accordingly. In the whole of the Pays de Vaud, the proportion of the population under sixteen was one third; in many parts, and in the whole of the Canton of Berne, one fourth; while in the United States, it is as high as one half.

We have seen, that, according to M. Muret, the probability of life, or the age to which half the born live, was, in the extraordinary parish of Leyzin, as high as 61 years. On the same authority, it appears that in nine other parishes of the Alps it was as high as 47; in 41 parishes of the Pays de Vaud and Jura 42; in 12 corn parishes 40; in 18 parishes among the great vineyards 37, in one marshy parish 24.²⁴ From other authorities we learn, that in country villages and parishes, the age to which half of the born live is such, that the major part will probably live to marry.²⁵ In the parish of Ackworth, in Yorkshire, it appears from an exact account kept by Dr Lee, of the ages at which all died there for twenty years from 1747 to 1767, that half the inhabitants live to the age of 46 (Price, vol. ii. p. 35, 7th edit.); and if the same account had been kept in many of the other healthy parishes in England, where the yearly mortality, instead of being 1 in 47 as in Ackworth, was 1 in 69, 1 in 66, and even 1 in 75 (vol. ii. p. 224), half of the born would be found to have lived to above 50 or 55. In the whole of Sweden, where the annual mortality, at the time referred to by Dr Price, was greater than 1 in 35, it appears from his tables, that half of the born must have lived to above 33 (vol. ii. p. 413, 7th edit.); and in Great Britain generally, where the mortality at present, after making due allowance for the omissions in the deaths, appears to be less than 1 in 51, it cannot be doubted that there is scarcely a village in the country tolerably well situated, where half of the born do not live till above 40. In towns the case is very different. According to the data collected by Dr Price, one half of the born died in London under three years of age, in Vienna and Stockholm under two, in Manchester under five, in Northampton under ten (vol. ii. p. 33); and although in most of these towns, particularly those in England, a great improvement has taken place in their healthiness of late years, yet still they will always fall far short of the healthiness of country situations.

The age to which half the born live appears, therefore, to vary in different countries and places, and under different circumstances, in the very extraordinary degree of from 3 to 60.²⁶

The mean age of death, or the expectation of life, must necessarily be more steady; yet it appears to vary from about 16 or 17 to 50.

In Stockholm, according to a table calculated by Dr Price, from the medium of three different enumerations in 1757, 1760, and 1763, the expectation of life for males at birth was 14.25, and for females 18.10.²⁷ Taken together, the expectation of life was a little above 16. In Vienna, as appears from another table, it was

16[1/2?].²⁸ While, according to M. Muret, at Leyzin, the expectation of life at birth was, about the same period, 50 years.²⁹

The annual mortality, which is different, both from the age to which half of the born live, and the mean age of death, is found to vary in different places and countries, from about 1 in 19 to about 1 in 70. In Stockholm, the annual mortality was but 1 in 19 (Price's *Observations*, vol. ii. p. 136); and in some of the villages in England, even at the time that Dr Price wrote, it was as low as 1 in 70 and 1 in 75.

The proportion of births to the population appears to vary in different countries and under different circumstances, from about 1 in 17 to 1 in 49. In New Spain, according to Humboldt, it was 1 in 17. In New Jersey, according to the rate of increase determined by the census taken in 1738 and seven years afterwards, the proportion of births must have been about 1 in 18. (Price, vol. ii. p. 50.) At present, as far as can be collected from scattered facts and inferences, the proportion of births in the whole of the United States is about 1 to 19. In the table for Prussia and Lithuania given by Süssmilch, it appears, that after the great plague of 1709 and 1710, and omitting the extraordinary year immediately subsequent, the proportion of births in the five years ending with 1716 was 1 in less than 17;³⁰ while, according to M. Muret, in the parish of Leyzin, the proportion of births was only 1 in 49 of the population.

The number of subsisting marriages which yields one annual birth appears to vary from 12 to 4, and the two extreme cases occur in what may be called the same country, and are both noticed by M. Muret; the one in the parish of Leyzin, which presents all the symptoms of the prudential check to population in the greatest excess, and where twelve subsisting marriages yield only one annual birth; and the other in the parish of St Cergue, in the Jura, where marriage is encouraged by the habit of emigration, and four subsisting marriages are sufficient to yield one annual birth.

The proportion of the population under 16 years of age to that above 16 seems to vary in different countries and places, and under different circumstances, from one half to one fourth. In the United States, it appears by the late census that it is one half; while in the canton of Berne it is not much more than one fourth, and in the parish of Leyzin not more than one fourth.³¹

The mortality under the age of 15 varies in different places and circumstances, from above two thirds to one fifth. It appears from a table of Dr Price, that in Stockholm above two thirds died under 15 (vol. ii. p. 418); while, according to M. Muret, the proportion of the deaths under the age of 15 was, in the whole of the Pays de Vaud, one third, in many parishes of the Alps one fourth, and in the extraordinary parish of Leyzin only one fifth.³²

Under these very great variations in the registers of different countries and places, and in the structure of their population, it is

obvious that we might fall into the grossest possible errors, by applying the registers of one country to the population of another. Even if we could find a country which was near to a just mean between these opposite extremes, and the registers of which were kept with the greatest accuracy, we could not apply such registers to any other country with a view to any important inferences, unless we knew that the two countries nearly resembled each other, not only in one or two particulars, but in all the main points relating to the structure of their population and the character of the prevailing checks to it.

When attention was first directed to tables of mortality with a view to assurances on lives and survivorships, these tables were almost universally formed from the registers of towns, and of the neighbouring villages influenced by them. Buffon, calculating the probability of life from the registers of three parishes in Paris, and twelve country parishes in the neighbourhood, collected by M. Dupré de St Maur, makes it appear that half of the born died under eight years of age. The parishes in Paris seemed to be healthier than the villages in the neighbourhood, which was occasioned by the custom of sending the children from the city to be nursed in the country. Other calculations from the registers of Breslau by Dr Halley, of London by Mr Simpson, and subsequently of Northampton, Warrington, Chester, Norwich, &c. by Dr Price and other writers, all concurred to convey the impression that more than half of the born die under the age of puberty; and though Dr Price, in his two volumes of *Observations on Reversionary Payments*, takes frequent opportunities of dwelling upon the prodigious difference in the mortality of towns and of country situations, and produces abundance of evidence to show that, taken together, in the actual state of things, half of the born live much beyond the age of puberty; yet, among some persons who have not attended to the subject, the former impression seems still to have remained; and, what is more strange, it has been lately asserted that this must happen from the constitution and course of human nature (*Godwin's Answer to Malthus*); which is going very much further than to say that it happens under the poverty, distress, and unhealthy occupations which are known to affect the mortality of a considerable body of people in all the nations with which we are acquainted.

The constitution and course of human nature can only be determined by experience, and the analogies derived from it; and the kind of experience necessary to determine the point in question is to be obtained only by a reference to registers which inform us of the ages at which the born have died. Now, from the evidence of registers of this kind which have been carefully kept in country parishes, it appears that the age to which half of the born live is much nearer to forty than to the age of puberty. Even in Sweden, where the general mortality is unquestionably very great, owing to the poverty of the labouring classes, and the diseases brought upon them by bad

and insufficient food during seasons of scarcity, the age to which half of the born live is, as before stated, above thirty-three;³³ in the whole of the Pays de Vaud it is forty-one; in many particular parishes forty-seven; in a parish in England not so healthy as many others, forty-seven; and as the expectation of life appears, by the late returns from the parish registers of Great Britain, to be as high as in Switzerland, there is little reason to doubt, from the evidence of registers, that the age to which half of the born live in this country can fall but little short of what it is in the Pays de Vaud, that is, it must be somewhere near forty. But it will hardly be contended that there is no premature mortality in Great Britain occasioned by the pressure of poverty, and the effect of large towns and unwholesome occupations. Consequently, unless we are prepared to say that agricultural employments, airy and moderately-sized towns, cleanliness, healthy occupations, and prudence, are against the constitution and course of nature, as applied to reasonable beings, we must acknowledge, that if the constitution and course of nature were carefully observed, and the admonitions which they give properly attended to, half of the born would, in healthy climates, live on an average to forty-five. Taking things, however, as they are, it is obvious that, according to the testimony of the best registers, more than half of the born might live to marry in most countries, even if the average age of marriage was so late as thirty.

The immediate cause of the increase of population is the excess of the births above the deaths; and the rate of increase, or the period of doubling, depends upon the proportion which the excess of the births above the deaths bears to the population.

The excess of births is occasioned by, and proportioned to, three causes: *1st*, the prolificness of the marriages; *2dly*, the proportion of the born which lives to marry; and, *3dly*, the earliness of these marriages compared with the expectation of life, or the shortness of a generation by marriage and birth, compared with the passing away of a generation by death.

In order that the full power of increase should be called into action, all these circumstances must be favourable. The marriages must be prolific, owing to their being contracted early; the proportion of the born living to marry must be great, owing both to the tendency to marriage, and the great proportion of births rising to the age of puberty; and the interval between the average age of marriage and the average age of death must be considerable, owing to the great healthiness of the country, and the expectation of life being high. Probably these three causes, each operating with the greatest known force, have never yet been found combined. Even in the United States, though the two first causes operate very powerfully, the expectation of life, and consequently the distance between the age of marriage and the average age of death, is not so favourable as

it might be. In general, however, the excess of births which each country can admit being very far short of the full power of increase, the causes above mentioned contribute to the required supply in very various proportions, according to the different circumstances and habits of each state.

It would be very desirable to know something of these proportions, with a view to their influence on the happiness of society. Our main sources of information on this subject are registers of births, deaths, and marriages; but in order to draw just inferences from them, we must consider well what they imply. The following observations and rules, modified from Mr Malthus's chapter on the fruitfulness of marriages, may be useful for this purpose.

If we suppose a country where the population is stationary, where there are no emigrations, immigrations, or illegitimate children, and where the registers are accurate, then the proportion of the annual births to the annual marriages will accurately express both the number of children born to each marriage, including second and third marriages, and also the proportion of the born which lives to marry once or oftener, while the annual mortality will accurately express the expectation of life.

But if the population be either increasing or decreasing, and the births, deaths, and marriages increasing or decreasing in the same ratio, such a movement will necessarily disturb all the proportions, because the events which are contemporary in the registers are not contemporary in the order of nature.

In the first place, the births of any year cannot, in the order of nature, have come from the contemporary marriages, but must have been derived principally from the marriages of preceding years.

If we were to cut off a period of thirty years in the registers of any country some time ago, and inquire what was the number of births which had been produced by all the marriages included in the period cut off, it is evident, that with the marriages at the beginning of the period will be arranged a number of births proceeding from marriages anterior to it; and at the end a number of births produced by the marriages included in the period will be found arranged with the marriages of a succeeding period. Now, if we could subtract the former number, and add the latter, we should obtain exactly all the births produced by the marriages of the period, and thus ascertain the real prolificness of marriages. If the population had been stationary, the number of births to be added would exactly equal the number to be subtracted, and the proportion of births to marriages, as found in the registers, would exactly represent the real prolificness of marriages. But if the population be increasing, the number to be added would be greater than the number to be subtracted, and of course the proportion of births to marriages, as found in the registers, would always be too small to represent the true prolificness of marriages. A contrary effect would take place in a decreasing popu-

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lation. The question therefore is, what we are to add, and what to subtract, when the births and deaths are not equal.

The average proportion of births to marriages in Europe, as taken from registers, is about four to one. Let us suppose, for the sake of illustration, that each marriage yields four children, one every other year. In this case, wherever the period in the registers is begun, the marriages of the preceding eight years will only have produced half their births, and the other half will be arranged with the marriages within the period, and ought to be subtracted from them. In the same manner the marriages of the last eight years of the period will only have produced half their births, and the other half ought to be added. But half the births of any eight years may be considered as nearly equal to all the births of the succeeding three years and three quarters. In instances of the most rapid increase it will rather exceed the births of the next three years and a half, and in cases of slow increase approach towards the births of the next four years. The mean, therefore, may be taken at three years and three quarters. Consequently, if we subtract the births of the first three years and three quarters, and add the births of the three years and three quarters subsequent to the period, we shall have a number of births nearly equal to the number of births produced by all the marriages included in the period, and, of course, the prolificness of marriages. But if the population of a country be increasing regularly, and the births, deaths, and marriages continue always to bear the same proportion to each other and to the whole population, it is evident that all the births of any period will bear the same proportion to all the births of any other period of the same extent taken a certain number of years later, as the births of any single year to the births of a single year taken the same number of years later. And, consequently, to estimate the prolificness of marriages, we have only to compare the marriages of the present, or any other year, or the mean of five years, with the births of a subsequent year, or the mean of five years taken three years and three quarters later.

It has been supposed, in the present instance, that each marriage yields four births; but the proportion of births to marriages apparent in the registers of most of the countries of Europe is four to one, and as the population of most of the countries of Europe is known to be increasing, the prolificness of marriages must be greater than four. If, allowing for this circumstance, we take the distance of four years instead of three years and three quarters, we shall still be sure of not erring in excess. And though undoubtedly the period which we take, whatever it may be, will not answer exactly in different countries, yet its application generally will not be so incorrect as we might at first imagine, because, in countries where the marriages are more prolific, the births generally follow at shorter intervals, and where they are less prolific, at longer intervals; and, with different degrees of prolificness, the length of the period might still remain

the same.

Probably, however, the period here assumed, which is the one taken by Mr Malthus, is too short. If, as he says, there is reason to think, that, in almost all registers, the omissions in the births and deaths are greater than in the marriages, there ought to be a greater number of births to each marriage, in which case it would take a longer time to have them in; and if, further, it is probable that a birth every other year is too rapid a succession for those countries where the marriages are frequently late, it may be thought that the births at the distance of five years will more nearly represent the prolificness of marriages than at the distance of four years. But this matter must be left to the judgment of the reader.

At all events, it will follow, from what has been said, that the more rapid is the increase of population, the more will the real prolificness of marriages exceed the proportion of births to marriages in the registers.

The rule which has here been laid down attempts to estimate the prolificness of marriages, taken as they occur; but this prolificness should be carefully distinguished from the prolificness of first marriages, and of married women, and still more from the natural prolificness of women in general, taken at the most favourable age. It is probable that the natural prolificness of women is nearly the same in most parts of the world; but the prolificness of marriages is liable to be affected by a variety of circumstances peculiar to each country, and particularly by the number of second, and third, and late marriages. In all countries the second and third marriages alone form a most important consideration, and materially influence the average proportions. According to Süssmilch, in all Pomerania, from 1748 to 1756 both included, the number of persons who married were 56,956, and of these 10,586 were widows and widowers.³⁴ According to Busching, in Prussia and Silesia, for the year 1781, out of 29,308 persons who married, 4841 were widows and widowers;³⁵ and, consequently, the proportion of marriages will be given fully one sixth too much. In estimating the prolificness of married women, the number of illegitimate births would tend, though in a slight degree, to counterbalance the overplus of marriages; and as it is found that the number of widowers who marry again is greater than the number of widows, the whole of the correction should not, on this account, be applied; but in estimating the proportion of the born which lives to marry, which is what we are now about to proceed to, the whole of this correction is always necessary.

To find the proportion of the born which lives to marry, from registers, we must consider that the marriages of any year can never be contemporary with the births from which they have resulted, but must always be at such a distance from them as is equal to the average age of marriage.

If the population be increasing, the marriages of the present year

nave resulted from a smaller number of births than the births of the present year; and, of course, the marriages, compared with the contemporary births, will always be too few to represent the proportion of the born which lives to marry, and the contrary will take place if the population be decreasing; and to find this proportion, after having first made the proper correction for second and third marriages, we must compare the marriages of any year with the births of a previous year at the distance of the average age of marriage.³⁶

The third principal object which it is desirable to attain, and of which some estimate may be formed from registers, is the expectation of life. It has before been stated, that, in a country where the births and deaths are equal, the rate of the annual mortality will express the expectation of life, or the average age of death. But if the population be increasing, the actual population of any one year will be greater than would belong to the contemporary deaths, supposing the births equal to the deaths, and less than would belong to the contemporary births, supposing the deaths equal to the births. Consequently, if we divide the actual population by the number of contemporary deaths in an increasing country, the result will be too high to express the average age of death belonging to any given number of births. If we divide the actual population by the number of births, the result will be too low to express this average, or, in other words, to express the expectation of life. And, in order to approximate to the true proportion, we are directed by Dr Price (vol. ii. p. 39, seventh edition), in the absence of better data, to divide the actual population by a mean between the proportions of deaths and births. Consequently, when we know the proportion of births to deaths in any country, and the proportions which they usually bear to the whole population, we may form some estimate of the expectation of life, or the average age of death.

If we attend to these observations in drawing our inferences from registers, we shall generally be able to form an approximating estimate of the prolificness of marriages, the proportion of the born living to marry, and the expectation of life, in different countries and places, and under different circumstances; or if we cannot do this satisfactorily, owing to the varying rate of increase, and the inaccuracy of the registers, we shall at least guard ourselves against drawing incorrect inferences from them in their present state, and reconcile many of the difficulties with which they appear to be accompanied.

Thus, to estimate the prolificness of marriages in England, the proportion of the marriages to the births, according to the parochial returns ending with 1820, was 100 to 369; adding one sixth for the omissions in the births, or on the present occasion only one seventh, in order to make full allowance for illegitimate births, the proportion of marriages to births will be as 100 to 422. These births, at the rate at which the population was increasing in England and Wales from 1810 to 1820, would, in about four years and a half, increase .07,

which, added to 4.22, makes 4.51. Consequently, the prolificness of marriages, taken as they occur, and including second and third marriages, would be 4.51. If we wish to estimate the prolificness of married women, we must subtract from the marriages those which consist of widows who have married again. According to some tables of Süssmilch, this would be little less than one sixth, according to others one eighth. If we take one seventh, and deduct it from the marriages, the proportion will be 1 to 5.26, that is, each married woman will have 5.26 births. But of these married women, some have married at above forty-five years of age, and many more above thirty-five, so that there can be little doubt that, if the births could be collected from all the marriages in which the age of the woman did not exceed thirty-five, nor the age of the man forty-five, the births would appear to be nearly six; and this number would be still further increased if the average age of marriage for males was twenty-two, and for females twenty. These conclusions are fully confirmed by some accurate observations of M. Muret. At Vevay, where the proportion of marriages to births, in the registers, was as ten to thirty-nine, he found that 375 mothers had had 2093 children born alive, by which it appears that each mother had produced 5.55 births. But these, M. Muret observes, were all mothers, which is not the case of all married women. Allowing, however, for the usual proportion of barren wives at Vevay, which was about twenty out of 478, it appears that the married women, one with another, must have had above 5.3 births. Yet this was in a town where he intimates that the inhabitants do not enter into the marriage state at the time when nature calls them, nor, when married, always have as many children as they might have. It is evident, therefore, that the proportions of marriages to births, to be found in registers, require considerable and important corrections, in order to deduce from them just estimates of the prolificness of marriages, the prolificness of married women, and the prolificness of women marrying at the most favourable age. The instance here given is sufficient to illustrate the mode in which the rule should be applied.

If we wish to apply the rule for estimating the proportion of the born living to marry in England, we must first take the proportion of marriages to births in the registers. This proportion, as before stated, was, during the ten years ending with 1820, as 100 to 369; which, increased by one sixth, the supposed omissions in the registers of births will be as 100 to 430. But the marriages of the present year must have resulted, not from the births of the present year, but from the births at such an earlier period in the registers as is equal to the average age of marriage. Suppose this age to be twenty-eight, then, at the rate at which the population was increasing, the present marriages must have resulted from a number of births equal to about two thirds of the present number, so as to be to the present marriages in the proportion of 286 instead of 430 to 100. But of the 200 persons

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forming the 100 marriages, more than one sixth have been married before. Deducting, therefore, one sixth from the marriages, the proportion of the marriages to the births from which they have resulted will be as 100 to 343; or, out of 343 births, 200 have lived to be married once or oftener; from which it would appear, that on account of the late increase in the healthiness of the country a greater proportion had lived to marry than when Mr Malthus last estimated it; which, together with a slight increase in the prolificness of marriages apparent in the latter registers, may account for the more rapid increase of the population from 1810 to 1820. It should be recollected, however, that as the rate of increase which prevailed from 1810 to 1820 had by no means prevailed during the whole twenty-eight years, the births, from which 200 person had lived to marry in 1820, were decidedly more than 343.

It will be observed how very important the correction for second and third marriages is. Supposing each marriage to yield four births, and the births and deaths to be equal, it might at first be thought necessary, that in order to keep up the population, half of the born should live to marry; but if, on account of the second and third marriages, we subtract one sixth from the marriages, and then compare them with the births, the proportion will be as five to twenty-four; and it will appear, that instead of one half, it will only be necessary, that out of twenty-four births, ten should live to marry. Upon the same principle, if the births were to the marriages as four to one, and exactly half of the born lived to marry, it might be supposed at first that the population would be stationary; but if we subtract one sixth from the marriages, and then compare them with the births, it will be obvious that, on the supposition of half the born living to marry, the births at the earlier period in the registers, at the distance of the age of marriage, must be to the present births as five to six, which would imply a moderate rate of increase.

To estimate the proportion of male births living to marry, we must subtract full one fifth from the marriages; and, according to this correction, if each marriage yielded four births, it would only be necessary that two male children out of five should live to marry, in order to keep up the population. It is necessary, also, in estimating the proportion of male births living to marry, to make allowance for the greater number of males born.

The foregoing illustrations and remarks show the error of supposing that a country must be in a precarious state when the proportion of births to marriages in the registers is less than four to one. If, indeed, this observation were just, the population of many countries in Europe would be in a precarious state, as in many countries the proportion is less than this. But it has been shown in what manner this proportion in the registers should be corrected, in order to make it a just representation of the prolificness of marriages; and if a large part of the born live to marry, and the age of marriage be con-

siderably earlier than the expectation of life, such a proportion in the registers is by no means inconsistent with a rapid increase of population.

In Russia, the proportion of births to marriages is less than four to one; yet, on account of the large proportion of the born living to marry, the early age of marriage, and the high expectation of life, it is one of the countries in Europe which increases the fastest. In England, the population increases much more rapidly than in France; yet in England the proportion of births to marriages in the registers, when allowance has been made for omissions, was, from 1800 to 1810, four to one, while in France it was four and four fifths to one. (Malthus, vol. ii. p. 161. 5th edit.)

In England, indeed, for the ten years from 1810 to 1821, the proportion of births to marriages seems slightly to have exceeded the former proportion, being about 4.22 to 1; but this excess has been accompanied by such a rapidity of increase as would double the population in less than forty-six years; and comparing this rapid rate of increase with the slow increase of France, where the births were to the marriages as four and four fifths to one, and in Sweden, where these proportions were as four and one fourth to one, it follows that the two other causes of the excess of births above the deaths, besides the prolificness of marriages, must have very great power, and that the proportion of births to marriages, as found in registers, when taken alone, is a most uncertain criterion of increase.

To apply the rule for estimating the average age of death, or the expectation of life, in England, we must first ascertain from the registers the proportions which the births and deaths bear to the whole population. The annual average of the births for the ten years from 1810 to 1821 was 325,506, of the deaths 200,999. Adding one sixth to the births, and one twelfth to the deaths, for the omission in the registers, the births will be 379,757, and the deaths 217,749. The population of England and Wales, according to the census taken in 1810, was 10,502,500, in 1821, 12,218,500,³⁷ the mean of which is 11,360,500. The average births and deaths, compared with the mean population, give $1/29.9$ as the proportion of the births, and $1/52.17$ as the proportion of the deaths; and, according to Dr Price, the mean between them, which in this case is forty-one, will give the expectation of life. This rule, however, is only a rough approximation, and, in the few cases where sufficient data have been obtained in progressive countries for calculating the expectation of life more accurately, it has turned out to be much nearer to the annual mortality than to the mean here referred to; while, according to the more correct estimates before adverted to, the annual mortality might, with the same expectation of life, be in different countries 1 in 39.38, 1 in 41.97, or 1 in 41.09, according as the population was stationary, or progressive at various rates.

This appears in the table which Dr Price himself calculated for

Sweden (vol. ii. p. 410, 7th edit.), founded on data which he considered as quite satisfactory. It also appears in the table for Sweden and Finland, subsequently calculated by Mr Milne from similar data, in his *Treatise on Annuities and Assurances*, vol. ii. p. 569; and, further, in a table for Sweden and Finland, published in this work, under the head MORTALITY. We have also seen a calculation by Mr Milne, by which it appears that the difference between the annual mortality and the expectation of life goes on increasing with the rate of the increase of the population to a certain point, but afterwards, owing to the increasing proportion of young children included in the population, diminishes; and is less when the population doubles in twenty-five years, than when it doubles in fifty years. Thus, on the three different suppositions of a stationary population, a population doubling in fifty years, and a population doubling in twenty-five years (all subjected to the same law of mortality as that which prevailed in Sweden and Finland during the five years ended with 1805), in the first case, both the expectation of life and the annual mortality would be 39.388, and, of course, the expectation of life would be the same in all the cases; but in the second case, the annual mortality would be 1 in 41.971; and, in the third, 1 in 41.096. It would be difficult, however, or at least premature, without further data, to lay down a general rule, with a view to determine correctly the expectation of life at birth, in countries progressive at various rates. But, from what has been stated, it may safely be concluded, that the expectation of life lies very much nearer the annual mortality, particularly in cases of very rapid increase, than to the mean proposed by Dr Price; and that both the expectation of life, and the age to which half of the born live, are, in most countries, and especially in England, at the present time, considerably higher than they have generally been estimated.

It may be remarked here, in reference to England during the ten years from 1810 to 1821, that the omissions assumed in the births and deaths do not give such proportions as to make the increase of population, from the excess of births above the deaths, answer to the increase determined by the two censuses; an agreement which must necessarily take place if both the enumerations and the registers are accurate, and no external causes disturb the result. An addition of one sixth to the births, and one twelfth to the deaths, seemed to answer correctly for the interval from 1800 to 1810; but to produce the same coincidence under the more rapid increase of the subsequent ten years, either a greater allowance must be made for omissions in the births, or a less allowance for the omissions in the deaths. If we add one fifth instead of one sixth to the births, retaining one twelfth for the deaths, the excess of births above deaths in the ten years will be 1,728,587, the excess according to the censuses being 1,716,000; if we add only one thirtieth to the deaths, retaining one sixth for the births, the excess will be 1,720,502, within

4502 of the excess, as shown by the censuses; whereas, under the actual allowances which have been made for omissions, the excess will be only 1,620,800, leaving a difference of 95,200, and on the wrong side. On account of the almost incredible healthiness, considering our great towns and manufactories, which would be implied by supposing the deaths to be only deficient one thirtieth, an increased omission in the births might be thought more probable; but it is believed, that since 1812 the omissions in the births have been diminished rather than increased; and under this uncertainty it has been thought better to leave the question as it stands at present, rather than attempt to determine it on insufficient data. It should always be remembered, however, that if the increase of population by the enumerations is different from the increase of population by the registers, one or the other must be incorrect.

On the supposition that the omissions in the deaths were only one thirtieth, the average mortality, compared with the average population, would be 1 in 54.7; and the proportion of births, with the addition of one sixth, being, as before stated, 1 in 29.9, the expectation of life, according to Dr Price's rule, would be 42.3. On the other supposition, of, an omission of one fifth of the births and one twelfth of the deaths, the births would be 1 in 29, and the deaths 1 in 152.17, and the expectation of life would be 40.58.

It appears, then, that when the population of a country is progressive, it would be erroneous to estimate its healthiness by the proportion which the annual mortality bears to the whole population. Healthiness must be measured by the expectation of life; and if, with the same expectation of life, the annual mortality is affected by the rate of increase, it is obvious that the healthiness of different countries may be different, with the same rate of annual mortality.

But whilst it is evidently necessary that we should be cautious in inferring that a country is healthy just in proportion to the smallness of its annual mortality, we should be still more cautious in inferring that it is unhealthy at all the ages under puberty, on account of the number which appear to die in mortuary registers under that age. Here, as in the preceding case, but in a much greater degree, the excess of the births above the deaths has a powerful effect, but exactly in the opposite direction. When we compare the annual mortality of an increasing country with its actual population, we compare with it a number of deaths which may be said, properly speaking, to belong to an earlier and smaller number of births, and must necessarily represent the country as more healthy than it really is. On the other hand, when, in a mortuary register, we compare the deaths under puberty with those above, if the population be increasing, we evidently compare the deaths belonging to a much greater number of births than those which have furnished the deaths above the age of puberty; and, consequently, these proportions must represent the country as much less healthy than it really is.³⁸ According to the mor-

tuary registers of Sweden for twenty-one years from 1755 to 1776, more than half of the deaths were under fifteen, but it was by no means true that half of the born died under fifteen.³⁹ In the tables of mortality for Sweden during the same period, constructed by Dr Price, it appears that half of the born lived to above thirty-three years.⁴⁰

In the same manner, in drawing inferences from an abstract of the mortuary registers of the principal cities in America, Baltimore, Boston, New York, and Philadelphia, given by Dr Seybert,⁴¹ we must take care not to conclude that the proportions of the deaths which take place under twenty years of age represent the proportions of any given number of births in these cities which die under twenty. As, on account of the excess of the births above the deaths, all the early ages of the population are more numerous in proportion than the other, there will necessarily be a greater proportion of the deaths at these ages than would naturally belong to a given number of births, if each infant born were traced to the age of its death.

In the present case, the abstract is only for a year, and no safe conclusions therefore can be drawn from it; but, so far as it goes, as even, notwithstanding the increase of population, these mortuary registers show that considerably less than half of the deaths take place under twenty (on an average only about 45½ per cent.), it would appear, that in the early ages of life, even the towns of America are more healthy than the whole of Sweden from 1755 to 1776. It should, however, be considered, that though the towns in America may be increasing fast by procreation, they are increasing still faster by the influx of inhabitants from the country; and as these inhabitants generally come to the towns after the age of sixteen, this accession diminishes the proportion of persons in the earlier ages of life so much, that there is probably a larger proportion of mortality at these ages in the country than in the towns.

One of the most interesting and useful points of view in which registers can be considered, is in the proofs which they afford of the varying prevalence of the prudential check to marriage and population in different countries and places. It has been not an uncommon opinion, and has even been strongly expressed of late years, although the subject has been much better understood than formerly, that the labouring classes of people, under the circumstances in which they are placed, cannot reasonably be expected to attend to prudential considerations in entering upon the marriage state. But that this opinion does them great injustice, is not only obvious to common observation, by which we can scarcely fail to see that numbers delay marriage beyond the period when the passions most strongly prompt to it, but is proved by the registers of different countries, which clearly show, either that a considerable number of persons of a marriageable age never marry, or that they marry comparatively late, and that their marriages are consequently less prolific

than if they had married earlier. As the prudential restraint on marriage may show itself in either of these ways, it may prevail nearly in the same degree with a different proportion of the whole population. But on the supposition of the same natural prolificness in the women of most countries, the smallness of the proportion of births will generally indicate, with tolerable correctness, the degree in which the prudential check to population prevails, whether arising principally from late, and consequently unprolific marriages, or from a large proportion of the population dying unmarried.

Referring, then, to the different proportions of births in different countries as the best criterion of the different degrees in which the prudential restraint on marriage operates, it will be recollected that these proportions vary from about one in thirty-six to about one in nineteen or even seventeen, in different countries, and in a much greater degree in different parishes or districts.

A particular parish in the Alps has already been mentioned, where the births were only a forty-ninth part of the population; and it appears by the late returns of the parish registers of England and Wales, that the births in the county of Monmouth are only one in forty-seven, and in Brecon one in fifty-three⁴² which, after making ample allowance for omissions, would show the prevalence of the prudential restraint on marriage in a high degree.

If in any country all were to marry at twenty or twenty-one, the proportion of the births would probably be more than one in nineteen; and this result would be still more certain if the resources of the country could not support an accelerated rate of increase, than if the means of subsistence were in the greatest abundance, and the demand for labour as effectual as it has ever been in the United States. Of the latter supposition, taking the births at one nineteenth, and the expectation of life the same as it is in England, the effect would be to occasion a most rapid increase of population; and the period of doubling, instead of being about forty-six or forty-eight years, would be less than in America. On the other hand, if the resources of the country could not support a more rapid increase than that which has taken place in England and Wales during the ten years previous to the census of 1821, the effect would be a great diminution in the expectation of life. If the births were one in nineteen instead of one in nearly thirty, the same rate of increase would take place as at present if the annual mortality were increased to about one in twenty-six and a half; and in that case the expectation of life would be reduced in the proportion of from forty-one, or, as is more probable, from above forty-five, to less than twenty-six.⁴³ This is the kind of effect which must inevitably follow the absence of the prudential check to marriage and population; and it cannot be doubted, that a considerable part of the premature mortality which is found to take place in all parts of the world is occasioned by it. The laws of nature, in application to man as a reasonable being,

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show no tendency to destroy half of the human race under the age of puberty. This is only done in very particular situations, or when the constant admonitions which these laws give to mankind are obstinately neglected.

It has been said that a tendency in mankind to increase at such a rate as would double the population in twenty-five years, and, if it had full scope, would fill the habitable globe with people in a comparatively short period, cannot be the law of nature, as the very different rate of increase which is actually found to take place must imply such an excessive degree of mortality and destruction of life as to be quite irreconcilable with actual facts and appearances. But the peculiar advantage of a law of increase in a geometrical progression is, that though its power be absolutely immense if it be left unchecked, yet, when this becomes impossible, it may be restrained by a comparatively moderate force. It can never of course happen that any considerable part of that prodigious increase which might be produced by an uninterrupted geometrical progression, should exist, and then be destroyed. The laws of nature, which make food necessary to the life of man, as well as of plants and animals, prevent the continued existence of an excess which cannot be supported, and thus either discourage the production of such an excess, or destroy it in the bud, in such a way as to make it scarcely perceptible to a careless observer. It has been seen, that in some countries of Europe where the actual progress of the population is slower than in many others, as in Switzerland and Norway, for instance, the mortality is considerably less. Here, then, the necessity of a greater check to the natural progress of population produces no increase of mortality. And it appears farther, that even the degree of mortality which in each year would be sufficient to destroy that excess of births which would naturally be produced if all married young, and all could be supported, might take place, and often does take place in particular situations, and yet is very little noticed. About the middle of last century, the mortality in Stockholm and London was about one in nineteen and one in twenty. This is a degree of mortality which would probably keep the births on a level with the deaths, even though all married at twenty. And yet numbers resorted both to Stockholm and London from choice, the greater part probably not aware that, by so doing, they would shorten their own lives and those of their children; and the rest thinking that the difference was not worth attending to, or was at least balanced by the advantages of society and employment which the town presented. There is nothing, therefore, in the actual state of the mortality observed to take place in different countries and situations, which, in the slightest degree, contradicts the supposition of a natural tendency to increase quite as great as that which has been stated.

It has been further remarked, that as, in point of fact, it very

rarely happens that mankind continue to increase in a geometrical progression of any kind, and only in a single instance in such a one as to double the population in twenty-five years, it is useless and absurd to lay any stress upon tendencies which never for any length of time together produce their natural effects. But it might really as well be said, that we are not to estimate the natural rate of increase in wheat or sheep, as it is quite certain that their natural tendency to increase has never practically continued to develop itself for so long a time together as that of mankind. Both as a physical and even economical question, it is curious and desirable to know the natural law of increase which prevails among the most important plants and animals. In the same view, it must be still more interesting to know the natural law of increase with respect to man. It may be said, indeed, with truth, that the actual appearances all around us,—the varying rate of increase in different countries, its very slow progress or stationary state in some, and its very rapid progress in others,—must be a mass of anomalies, and quite contrary to the analogies of all the rest of animated nature; if the natural tendency of mankind to increase be not at the least as great as that which is developed under the most favourable circumstances, while in all others it is kept down by the varying difficulties which the state of the soil and other obstacles oppose to it. But the question, as it applies to man, assumes at once a tenfold importance, in reference to the moral and political effects which must result from those checks to increase, the existence and operation of which, in some form or other, no human exertions can by possibility prevent. A field is here opened for the most interesting inquiries which can engage the friends of human happiness.

But, as a preliminary to these inquiries, it is obvious that we must know the degree of force to be overcome, and the varying character of the checks which, in the different countries of the world, are practically found to overcome it; and, for this purpose, the first step must be an endeavour to ascertain the natural law of population, or the rate at which mankind would increase under the fewest known obstacles. Nor can this tendency to increase ever safely be lost sight of in the subsequent inquiries, which have for their object the improvement of the moral condition of man in society.

The existence of a tendency in mankind to increase, if unchecked, beyond the possibility of an adequate supply of food in a limited territory, must at once determine the question as to the natural right of the poor to full support in a state of society where the law of property is recognised. The question, therefore, resolves itself chiefly into a question relating to the necessity of those laws which establish and protect private property. It has been usual to consider the right of the strongest as the law of nature among mankind as well as among brutes; yet, in so doing, we at once give up the peculiar and distinctive superiority of man as a reasonable being, and class

him with the beasts of the field. In the same language, it may be said that the cultivation of the earth is not natural to man. It certainly is not to man, considered merely as an animal without reason. But to a reasonable being, able to look forward to consequences, the laws of nature dictate the cultivation of the earth, both as the means of affording better support to the individual, and of increasing the supplies required for increasing numbers; the dictates of those laws of nature being thus evidently calculated to promote the general good, and increase the mass of human happiness. It is precisely in the same way, and in order to attain the same object, that the laws of nature dictate to man the establishment of property and the absolute necessity of some power in the society capable of protecting it. So strongly have the laws of nature spoken this language to mankind, and so fully has the force of it been felt, that nothing seems to be thought so absolutely intolerable to reasonable beings as the prevalence in the same society of the right of the strongest; and the history of all ages shows, that if men see no other way of putting an end to it, than by establishing arbitrary power in an individual, there is scarcely any degree of tyranny, oppression, and cruelty, which they will not submit to from some single person and his satellites, rather than be at the mercy of the first stronger man who may wish to possess himself of the fruit of their labour. The consequence of this universal and deeply-seated feeling, inevitably produced by the laws of nature, as applied to reasonable beings, is, that the almost certain consequence of anarchy is despotism.

Allowing, then, distinctly, that the right of property is the creature of positive law, yet this law is so early and so imperiously forced on the attention of mankind, that if it cannot be called a natural law, it must be considered as the most natural as well as the most, necessary of all positive laws; and the foundation of this pre-eminence is its obvious tendency to promote the general good, and the obvious tendency of the absence of it to degrade mankind to the rank of brutes.

As property is the result of positive law, and the ground on which the law which establishes it rests is the promotion of the public good and the increase of human happiness, it follows, that it may be modified by the same authority by which it was enacted, with a view to the more complete attainment of the objects which it has in view. It may be said, indeed, that every tax for the use of the government, and every country or parish rate, is a modification of this kind. But there is no modification of the law of property having still for its object the increase of human happiness, which must not be defeated by the concession of a right of full support to all that might be born. It may be safely said, therefore, that the concession of such a right, and a right of property, are absolutely incompatible, and cannot exist together.

To what extent assistance may be given even by law to the poor-

er classes of society when in distress, without defeating the great object of the law of property, is essentially a different question. It depends mainly upon the feelings and habits of the labouring classes of society, and can only be determined by experience. If it be generally considered as so discreditable to receive parochial relief, that great exertions are made to avoid it, and few or none marry with a certain prospect of being obliged to have recourse to it, there is no doubt that those who were really in distress might be adequately assisted, with little danger of a constantly increasing proportion of paupers; and in that case a great good would be attained, without any proportionate evil to counterbalance it. But if, from the numbers of the dependent poor, the discredit of receiving relief is so diminished as to be practically disregarded, so that many marry with the almost certain prospect of becoming paupers, and the proportion of their numbers to the whole population is in consequence continually increasing, it is certain that the partial good attained must be much more than counterbalanced by the general deterioration in the condition of the great mass of the society, and the prospect of its daily growing worse; so that, though, from the inadequate relief which is in many cases granted, the manner in which it is conceded, and other counteracting causes, the operation of poor-laws such as they exist in England might be very different from the effects of a full concession of the right, and a complete fulfilment of the duties resulting from it, yet such a state of things ought to give the most serious alarm to every friend to the happiness of society, and every effort consistent with justice and humanity ought to be made to remedy it. But whatever steps may be taken on this subject, it will be allowed, that with any prospect of legislating for the poor with success, it is necessary to be fully aware of the natural tendency of the labouring classes of society to increase beyond the demand for their labour, or the means of their adequate support, and of the effect of this tendency to throw the greatest difficulties in the way of permanently improving their condition.

It would lead far beyond the limits which must be prescribed to this article, to notice all the various objections which have been made by different writers to the principles which have been here explained. Those which contain in them the slightest degree of plausibility have been answered by Mr Malthus in various parts of the late editions of his work, and particularly in the appendix to the fifth edition, to which we refer the reader. We will only, therefore, further notice the objection which has been made by some persons on religious grounds; for, as it is certainly of great importance that the answer which has been given to it should be kept in mind, we cannot refuse a place to a condensed statement of it at the end of this article.

It has been thought that a tendency in mankind to increase beyond the greatest possible increase of food which could be pro-

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duced in a limited space, impeaches the goodness of the Deity, and is inconsistent with the letter and spirit of the Scriptures. If this objection were well founded, it would certainly be the most serious one which has been brought forward; but the answer to it appears to be quite satisfactory, and it may be compressed into a very small compass.

First, It appears that the evils arising from the principle of population are exactly of the same kind as the evils arising from the excessive or irregular gratification of the human passions in general, and may equally be avoided by moral restraint. Consequently, there can be no more reason to conclude, from the existence of these evils, that the principle of increase is too strong, than to conclude, from the existence of the vices arising from the human passions, that these passions are all too strong, and require diminution or extinction, instead of regulation and direction.

Secondly, It is almost universally acknowledged, that both the letter and spirit of revelation represent this world as a state of moral discipline and probation. But a state of moral discipline and probation cannot be a state of unmixed happiness, as it necessarily implies difficulties to be overcome, and temptations to be resisted. Now, in the whole range of the laws of nature, not one can be pointed out which so especially accords with this scriptural view of the state of man on earth; as it gives rise to a greater variety of situations and exertions than any other, and marks, in a more general and stronger manner, and nationally as well as individually, the different effects of virtue and vice, of the proper government of the passions, and the culpable indulgence of them. It follows, then, that the principle of population, instead of being inconsistent with Revelation, must be considered as affording strong additional proofs of its truth.

Lastly, It will be acknowledged, that in a state of probation, those laws seem best to accord with the views of a benevolent Creator, which, while they furnish the difficulties and temptations which form the essence of such a state, are of such a nature as to reward those who overcome them with happiness in this life as well as in the next. But the law of population answers particularly to this description. Each individual has the power of avoiding the evil consequences to himself and society resulting from it, by the practice of a virtue dictated to him by the light of nature, and sanctioned by revealed religion. And as there can be no question that this virtue tends greatly to improve the condition and increase the comforts both of the individuals who practise it, and through them of the whole society, the ways of God to man with regard to this great law are completely vindicated.

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Subjoined are two tables, which may assist the reader in calculating the rate of increase in different countries, under different circumstances, and from different data. The first is the table calculated by Euler, and printed in Mr Malthus's work, at the end of his chapter on the Fruitfulness of Marriage; and the second has been calculated by Mr Bridge of Cambridge, well known as an able mathematician, and most useful elementary writer.

The first is to be used when it is wished to estimate the rate of increase by the proportions of the births to the deaths, and of these to the whole population. The yearly increase of people, independently of immigration, is the yearly excess of the births above the deaths; and the yearly rate of increase is measured by the proportion which this excess bears to the whole population. The fraction expressing the deaths must therefore be subtracted from the fraction expressing the births, and the remainder will be the fraction expressing the yearly rate of increase; opposite to which will be found the number of years in which the population will double itself, supposing the yearly rate of increase to continue the same for a sufficient length of time.

The second table is to be used when it is wished to know the period of doubling, resulting from a given per centage increase in ten years, determined by enumeration. An estimate of population from births and deaths is always liable to much uncertainty, on account of the varying proportions which they bear to the population. The only remedy for this uncertainty is a census; and as the useful custom of taking a census of the population every ten years has latterly prevailed in some countries, the second table is constructed to show the period of doubling, or general rate of increase, which results from any given per centage increase in ten years. The first column represents the per centage increase in ten years determined by two enumerations; and the second column the number of years in which the population will double itself, supposing it to proceed at the same rate.

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TABLE I.

The Proportion of the Excess of Births above the Deaths to the whole of the Living.	Periods of Doubling in Years and Ten Thousandths Parts.	The Proportion of the Excess of Births above the Deaths to the whole of the Living.	Periods of Doubling in Years and Ten Thousandths Parts.
1: { 10 11 12 13 14 15 16 17 18 19 20	7·2722 7·9659 8·6595 9·3530 10·0465 10·7400 11·4333 12·1266 12·8200 13·5133 14·2066	1: { 110 120 130 140 150 160 170 180 190 200	76·5923 83·5230 90·4554 97·3868 104·3183 111·2598 118·1813 125·1128 132·0443 138·9757
1: { 21 22 23 24 25 26 27 28 29 30	14·9000 15·5932 16·2864 16·9797 17·6729 18·3662 19·0594 19·7527 20·4458 21·1391	1: { 210 220 230 240 250 260 270 280 290 300	145·9072 152·8387 159·7702 166·7017 173·6332 180·5647 187·4961 194·4275 201·3590 208·2905
1: { 32 34 36 38 40 42 44 46 48 50	22·5255 23·9119 25·2983 26·6847 28·0711 29·4574 30·8438 32·2302 33·6161 35·0029	1: { 310 320 330 340 350 360 370 380 390 400	215·2220 222·1535 229·0850 236·0164 242·9479 249·8794 256·8109 263·7425 270·6740 277·6055
1: { 55 60 65 70 75 80 85 90 95 100	38·4687 41·9345 45·4003 48·8661 52·3318 55·7977 59·2634 62·7292 66·1950 69·6607	1: { 410 420 430 440 450 460 470 480 490 500	284·5370 291·4685 298·4000 305·3314 312·2629 319·1943 326·1258 333·0573 339·9888 346·9202
		1: 1000	693·49

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TABLE II.

Per Cent- age In- crease in Ten Years.	Period of Doubling.	Per Cent- age In- crease in Ten Years.	Period of Doubling.
	Years.		Years.
1.	696.60	23.5	32.83
1.5	465.55	24.	32.22
2.	350.02	24.5	31.63
2.5	280.70	25.	31.06
3.	234.49	25.5	30.51
3.5	201.48	26.	29.99
4.	176.73	26.5	29.48
4.5	157.47	27.	28.99
5.	142.06	27.5	28.53
5.5	129.46	28.	28.07
6.	118.95	28.5	27.65
6.5	110.06	29.	27.22
7.	102.44	29.5	26.81
7.5	95.84	30.	26.41
8.	90.06		
8.5	84.96	30.5	26.03
9.	80.43	31.	25.67
9.5	76.37	31.5	25.31
10.	72.72	32.	24.96
		32.5	24.63
10.5	69.42	33.	24.30
11.	66.41	33.5	23.99
11.5	63.67	34.	23.68
12.	61.12	34.5	23.38
12.5	58.06	35.	23.09
13.	56.71	35.5	22.81
13.5	54.73	36.	22.54
14.	52.90	36.5	22.27
14.5	51.19	37.	22.01
15.	49.59	37.5	21.76
15.5	48.10	38.	21.52
16.	46.70	38.5	21.28
16.5	45.38	39.	21.04
17.	44.14	39.5	20.82
17.5	42.98	40.	20.61
18.	41.87		
18.5	40.83	41.	20.17
19.	39.84	42.	19.76
19.5	38.91	43.	19.37
20.	38.01	44.	19.00
		45.	18.65
20.5	37.17	46.	18.31
21.	36.36	47.	17.99
21.5	35.59	48.	17.68
22.	34.86	49.	17.38
22.5	34.15	50.	17.06
23.	33.48		

For the population of the British Isles, see the articles ENGLAND, SCOTLAND, and IRELAND.

(T. R. M.)

NOTES

¹The present article on POPULATION, written for the last edition of this work by the late Mr. Malthus, has been permitted to stand in its entirety in the present edition. The Editor has been persuaded to adopt this course, more perhaps from the acknowledged excellence of the article itself, than from a strict regard to the perfect justness of all its sentiments. No one will doubt the writer's fundamental principle—that the amount of the human race must be in a proportion to the amount of food procurable for their support. But instead of drawing from this an injunction to mankind to throw their energies into productiveness, his argument seems to lead to the necessity of preventing increase, from a dread that it might outdo the production of food. Malthus omitted the influence of free trade, which puts all the world at the command of an increasing and producing people.

²*Nouvelle Espagne*, liv. iv., c. ix., p. 98.

³These numbers are taken from Dr Seybert's Statistical Annals, p. 23.

⁴This number is taken from the American National Calendar for 1822, and has since been compared with the original census as published for the use of the members of Congress.

⁵This number is taken from the American National Calendar for 1822, and has since been compared with the original census as published for the use of the members of Congress.

⁶This mode was suggested by Mr Booth, in Mr Godwin's Answer to Mr Malthus.

⁷Seybert's Statistical Annals, p. 23.

⁸American National Calendar for 1822, p. 246.

⁹The details which M. Humboldt has given of the population of New Spain are highly interesting, as they are the first of any consequence which the public has yet received of a tropical climate. The peculiarities which mark them are exactly of the kind which might have been expected, though the proportion of births is still greater than we could have ventured to suppose.

¹⁰*Essai Politique sur le Royaume de la Nouvelle Espagne*, liv. ii. chap. iv. pp. 330 *et seq.* vol. i. Oct.

¹¹*Göttliche Ordnung*, vol. i, table xxi.

¹²Malthus on Population, vol. i, p. 439, 5th edit.

¹³Report of the Preliminary Proceedings under Population Act, 58th Geo. III. p. 28.

¹⁴Population Abstract, 1821: Preliminary Observations, p. 8.

¹⁵*Ibid.*

¹⁶Principles of Political Economy, c. iv. Sect. 2.

¹⁷*Göttliche Ordnung*, vol. i. c. iv. s. 67, p. 128. Malthus' Essay on Population, b. ii. c. iv. p. 444 of vol. i. fifth edition.

¹⁸This very large proportion of marriages could not all have been supplied from the births in the country, but must have been occasioned in part by the influx of strangers.

¹⁹Süssmilch, *Göttliche Ordnung*, vol. 1. p. 226. Essay on Population, vol. i. p. 466, fifth edition.

²⁰*Memoires &c. par la Société de Economique Berne*, 1766, pp. 15 *et seq.* Essay on Population, vol. i. pp. 464 *et seq.* fifth edition.

²¹*Memoires &c. par la Société de Economique Berne*, 1766, pp. 48 *et seq.*

²²*Ibid.* table v. p. 65 of the tables.

²³See Malthus on Population, chapters i. and ii. of book ii.

²⁴*Memoires &c. par la Société de Economique Berne*, 1766, table viii. p. 92 of the tables. As these calculations seem all to have been made from mortuary registers, they are all too low, except where the population was absolutely stationary.

²⁵Graunt's and Short's Observations, &c. referred to by Dr Price, vol. ii. pp. 41, 42, &c. 7th edition.

²⁶This last number, stated by M. Muret for the parish of Leyzin, on the Alps, is so very extraordinary, that possibly it may not be correct.

²⁷Observations on Reversionary Payments, vol. ii. p. 421, 7th edition.

²⁸*Ibid.* vol. ii. p. 128.

²⁹*Memoires &c. par la Société de Economique Berne*, 1766, table v. p. 65.

³⁰*Göttliche Ordnung*, vol. i. table xxi. p. 83 of the tables. Malthus, vol. ii. p. 168, 5th edition.

³¹*Memoires &c. par la Société de Economique Berne*, 1766, pp. 11 and 12.

³²*Ibid.* table xiii. p. 12.

³³We allude to the registers and tables referred to by Dr Price. Since his time the health of the country has increased, like that of most of the countries in Europe, and the proportions of both the births and deaths have decidedly diminished.

³⁴*Göttliche Ordnung*, vol. i. tables, p. 98.

³⁵Malthus, vol. ii. p. 140.

³⁶It is a shorter and more obvious process to compare the marriages at once with the births of the earlier period, than with the deaths, as Mr Malthus has done.

³⁷Preliminary Observations to Population Abstracts, p. 32.

³⁸In the first case, the effect is, in a considerable degree, counteracted by the large proportion of children under four years old, which a rapid increase occasions. In the second case, the effect has no such drawback.

³⁹Price's Observations, vol. ii. p. 405, 7th edit.

⁴⁰*Ibid.* table xlv. vol. ii. p. 413

⁴¹Statistical Annals, p. 48.

⁴²Preliminary Observations, p. 27.

⁴³If, as it has appeared, the expectation of life, though by no means the same, does not differ very much from the annual mortality, and the annual mortality in this country during the ten years from 1810 to 1820, after every abatement, appears to be no more than one in fifty-one, the expectation of life cannot be less than forty-five, and is probably greater.